THE FARMERS' REGISTER.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

AGRICULTURAL EXCURSION IN THE GENESEE VALLEY CONTINUED.

From the New Genesee Farmer.

Buckwheat is raised to some extent, but not largely. I could not learn that in any case it had been used as a green-dressing to be ploughed in, a process not unknown in some parts of the country, and from which I believe much benefit may be derived. The cost of the seed is a small affair; and preference of such management over a naked fallow can hardly admit of a doubt. A few careful experiments in this case would decide an important question.

Grasses.—The grasses cultivated are the red-clover and timothy or herds-grass. The meadows or alluvions on the Genesee river abound in rich natural grasses, and are peculiarly favorable to the growth of grass.

In one or two cases, on a small scale, I found the orchard grass cultivated; but merely as an experiment; and I met with two small fields or rather patches of millet, sown probably for the same reason. The stalk was extremely large, which indicated, in my opinion, too thin sowing; certainly, if it were intended that it should be cut for hay. This is a common error. The allowance, with most farmers, of seed for a crop of millet is one peck per acre. If the land is rich, the stalk in such case becomes as large as brush; but where a bushel is sown to an acre, the stalk is small and fine, and the hay, when well cured, of the very best description. I have myself obtained three tons to an acre, weighed, after being well cured, at the public scale.

Of grasses, clover is extensively cultivated. It is sown on the wheat in the spring at the rate of 7 or 8 pounds to the acre. It is commonly depastured in the fall, and the field is allowed to continue in clover the ensuing year, and the succeeding spring is ploughed and fallowed for wheat. In other cases it is depastured in the fall of the year in which it is sown; and in the ensuing spring the land is ploughed and fallowed for wheat.

There may be said to be three distinct kinds of clover customarily sowed by the farmers; the first is the June or southern clover; this is comparatively small and ripens early, the next is the northern or Vermont clover, which ripens late and grows with great luxuriance; the third is the Ohio clover, which holds a medium character between the two. I found that both for hay or for ploughing in with the stubble, farmers differed in their choice, preferring either the southern or the Ohio clover. The southern clover makes the best hay and is more easily cured than either of the others. The northern clover makes a very coarse hay.

The crop in general averages from two to three tons. The opinion of many of the best practical farmers, whom I consulted, is decidedly in favor of curing it mainly by sweltering in the cock. In this case it is cut but not spread, and after lying in swath until it becomes entirely dry from extraneous wet and slightly wilted, it is put into small cocks and suffered so to remain until it becomes *made*, which can only be determined by good judgment and experience. The cocks are then turned directly upside down, until the dampness gathered at the bottom of the cock is wholly dried off, and are then carried into the barn. I have known this same method practised by some of the best farmers in Massachusetts, and in other parts of New York; and the hay under such circumstances retains its sweetness and color, the flowers and leaves are not shaken off and lost, as when the grass is much tossed about and spread; and the hay proves of an excellent quality.

Timothy or herds-grass cannot be said to be cultivated extensively, though I think some of the finest fields of herds-grass which I have ever seen, I found on Mr. Le Roy's place near Avon, on the opposite side of the river. I hardly know what could be more luxuriant, even and beautiful. On the Genesee flats above in the great valley, the hay was most abundant, but, as I have remarked, of a more mixed character. Mr. Wadsworth is accustomed to feed or depasture some of his fields so late in the spring that the crop of grass is not fit to be cut until the season is far advanced. This divides and extends his time of haying, as the different fields ripen in succession, and his haying season reaches into September. This late-grown hay is, I presume, not so substantial and nutritious as an earlier crop would be, partaking very much of the character of rowen, but this is compensated by the advantages of the feed in the spring. The practice of taking two crops does not, that I could learn, prevail here: and this I believe from an oppressive feeling of abundance rather than that it might not in many cases be done to advantage, for with respect to many of the farmers of this rich section of country, the case must be as with a farmer mentioned in another place, who needed to pull down his barns and build greater, that he might have where to bestow all his goods.

It is difficult to estimate with any great exactness the ordinary yield of these best lands in grass, but it may be safely put down as averaging over two tons per acre. I do not know where finer crops are to be found, and this would be an under estimate of some fields which I went into.

Hay is, in many cases, stacked, sometimes near the barns and at other times in the fields. I saw but few instances in which these stacks were thatched; but in many the stacks were put up with extraordinary skill and care, and so were pretty thoroughly protected against the weather. Mr. Wadsworth has, scattered over his fields and meadows, a great many small barns in which the hay is stored; and at which places his cattle and sheep are fed in the winter, but not housed.

The proper stacking of hay is quite an art, which an Englishman or Scotchman understands well; and if allowed to take his own way will perform with so much skill, I may add, taste, that I have often admired these stacks for their effectual protection of the hay, when well thatched,

and for their beauty as picturesque objects in a rural landscape. But it is an art of which in general a Yankee knows nothing, and in which he is commonly a sad bungler; and this not from any want of capacity, but from a deficiency of patience, owing to the driving haste with which most things are carried on among us; and from a habit, but too common, of only half doing most things which we undertake.

Of *stock* in the Genesee valley and its vicinity, I can judge but very imperfectly. It is hardly to be considered at present as a stock-raising district, the land being chiefly devoted to the growing of wheat and grass. Mr. Wadsworth feeds large numbers of cattle upon his meadows, but many of these are purchased and not bred by him. He has bred, however, some improved stock, and has several animals of full and mixed blood. Mr. Le Roy and Mr. Newbold, in York, have a considerable herd of improved animals of a high character. I saw them merely in passing, and regretted that I could not go among them; but they are held in high estimation in the opinion of competent judges.

I scarcely found a farm where any considerable number of cows were kept for dairy purposes beyond the use of the family. The cows met with in general were of no particular breed; and were, as far as I observed, in good condition. Perhaps I should except from this eulogium the cows which go in the highway, a race which, in Ireland, are so much valued for their skill in leaping hedges and ditches; and at sales are always commended for their capacity of "getting their own living." I could get no exact account of any dairy product. The average yield of a good cow in new milk cheese was stated at about 300 lbs., and where her milk was devoted exclusively to butter, at 110 to 150 lbs. per annum. These statements, however, were rather conjectural than ascertained; but to all inquiries respecting the yield of their cows in milk, the stereotyped answer was always made, that they gave a *pailful* at a milking; an answer which I have always admired for its precision, especially as pails are all of one size!

The general impression among the farmers in this part of the country seemed to be, that while the improved Durham stock was decidedly to be preferred for its beauty, size and thrift, yet for milk they were considered inferior to the best selected cows of our native stock. The first crosses have almost always proved well. How far this impression or opinion is to be valued must depend on many circumstances. It may be mere prejudice or an opinion taken up at hap-hazard; and but very few persons, if any, in this part of the country have had that long and careful experience with the race, that would justify them in coming to so great a conclusion. The truth is, with a few exceptions, we in fact know little of this stock at present; and the haste with which some men approve or condemn, is well illustrated within my own experience, where, for example, an individual farmer of no mean judgment undertook to give their character with perfect decision, whose whole knowledge of them extended to the owning of a half-blood two years old bull for a few months.

If any man, however, chooses to see this stock in perfection, let him go to the farm of E. P. Prentice of Albany; and if he has any prejudices of any kind against the stock, and is not then prepared to yield every one of them, I can only say he is differently constituted from what I am. Mr. Prentice has about forty animals of the improved Durham short horn, of pure blood and of the highest pedigree. He has one cow with seven heifers of her own progeny along side of her, six of which were in milk. A stock of larger size, of more symmetrical form, of equal beauty, of finer feel, of more thrift, of greater productiveness, I never have seen and never expect to see; nor do I expect to see a herd better kept, nor better arrangements for their keeping. To an amateur, to an inquisitive farmer, who desires to see what skill, intelligence and care can effect in moulding and improving the animal frame, it is worth a journey from Rochester to Albany on foot to see this stock. It is worth almost as much to see Mr. Prentice's stable arrangements and the tidy manner in which every thing is kept. Some few farmers among my acquaintance, in going there, would hardly know that they were not in their own best parlors. This, however, seems to convey a slight reflection upon some farmers' wives; but that is not my intention; and, as I would not upon any account be disrespectful towards the ladies, I beg my readers to draw black lines around this paragrapth and consider it as "expunged."

I have only to desire that Mr. Prentice would by a lactometer ascertain the qualities of his milk; and then that he would ascertain the actual yield in butter of several of his animals for a week or so; and when this is done, that he would show his benevolent countenance in the New Genesee Farmer, and let our readers know all about it. Our friend Tucker, of the Cultivator, has too much generosity to complain of this; or to think we have jumped over the fence into his pasture, with a view to catch and bridle one of his best colts. He has a full team always in his own stables.

The farm work in this part of the state is performed almost exclusively by horses. The horses in general are horses of all work. No horses among us are raised for the turf, and the various vehicles in use, wagons, dearborns, buggies, sulkies, &c., have put saddles almost wholly out of use. This is to be regretted, for there is no more manly, healthy, and vigorous exercise, for man or woman, than riding on horseback. The horses in general are of a medium size, and impressed me favorably.

Of the comparative expediency of keeping horses rather than oxen, or otherwise, I shall not speak in this place. Confidently as some persons have decided in this case for themselves, there are yet two sides to the question. A pair of horses is required on almost every farm for market, church, visiting and business from home; but if the team must be extended beyond this, it is well worth considering whether oxen may not be kept to more advantage than horses. We shall now give no opinion in the case, but suggest it for farther inquiry.

Of *sheep* I saw some flocks, but not many large ones. Mr. Wadsworth has several thousand; the Shakers at Groveland have a considerable flock; Theron Brown of Wheatland, has a flock of 500 sheep of mixed blood. His wool brought

this year 28 cents per lb., last year 35 cents.; the previous year 44 cents. The average yield of this flock, where there was a large proportion of wethers, was 3 lbs. 4 oz. of washed wool to each sheep.

In his opinion, 7 sheep require a ton of hay for wintering. Hay is valued at 5 dollars per ton. The annual increase of the flock is reckoned at 25 per cent. The value of mutton here is very little, and that increase will do little more than keep the flock good. Giving, however, the flock the advantage of all the increase, the account may be thus stated:

Wool, 3¼ lbs. at 28 cents	91 cents.
Lamb, 1 in 4 or 1-4th,	25 "
	116
Keeping 1-7 of 500,	71 cents.
Pasturage, say	40 "
	111

Net balance in favor of sheep, 5 cents.

This presents no great encouragement to the sheep husbandry. Mr. Brown is of opinion that swine and cattle are not worth raising beyond the wants of the family. I give it as the opinion expressed by him and some other farmers to me, but as a matter in my own judgment admitting of several qualifications. It is a complex question, in which a good many elements are involved, and my very imperfect knowledge in this case does not authorize me to pronounce with decision.

The value of land is rated here at 50 dollars per acre. The yield of hay estimated at 1½ tons. The hay at the above estimate would be equal to $7,50, and the expense of getting can hardly be less than $2,50 per acre, leaving 5 dollars income in favor of the land. But on a farm it must be considered that there is much land in wood or in fallow, or otherwise unproductive; and there are uncertainties attending all crops and seasons.

FARMING OF MR. WILLIAM WEAVER, OF ROCKBRIDGE COUNTY, VIRGINIA.

To the Editor of the Farmers' Register.

Mr. William Weaver, a wealthy iron-master of this county, and one of the most judicious practical farmers I have ever known, has, for several years past, been cultivating a portion of his extensive estate with distinguished success, upon a system entirely novel in this section of country, the Valley of Virginia, a brief outline of which may not be unacceptable to some of your readers.

The traveller from Lynchburg to Lexington, up the picturesque and romantic valleys of the James and North rivers, cannot fail, if he will but lift up his eyes as he approaches the mouth of Buffalo, about nine miles from the latter place, to observe, at the distance of two or three miles up the river, a cluster of precipitous hills—the outposts, as it were, of the Blue Ridge—proudly rearing their green and rounded summits above the adjacent valley, and apparently covered to their very tops, by the hand of man, with the richest and most luxuriant vegetation. These steep and rough hills, most appropriately designated by Mr. Weaver as the "*Highland Farm*," against which the North river dashes its foaming torrent, which slope in every direction from their summits to their base, presenting angles of from twenty to fifty degrees, constitute the land in question.

About ten or twelve years ago, Mr. Weaver purchased this farm, now embracing upwards of 800 acres, in several distinct tracts, at an average price of $2 an acre, principally for the purpose of procuring the wood, with which it was then covered, with the exception of about 100 acres of cleared and exhausted land, to supply his iron establishment with coal. The native growth consisted of oak, hickory and dogwood, with large pines interspersed. The soil is a red gravel, strongly dashed with slate, reposing on a limestone foundation. So unpromising an appearance did this land present for agricultural purposes, that when Mr. Weaver told his neighbors he intended to make a corn farm of these poor and steep hills, a laugh of derision was the only encouragement he received.

As the clearing progressed, Mr. Weaver divided the cleared land into four fields, one of 100 acres for standing pasture, and three of about 120 acres each for cultivation. The first field of new ground was broken up, early in the spring, with McCormick ploughs, drawn by two mules each, and cultivated in corn. The crop did not exceed an average of twenty bushels to the acre. In the fall the field was seeded in wheat, upon which, late in the winter, the usual quantity of clover seed, and half a bushel of plaster, were sown to the acre. After the wheat was removed at harvest, the stubble was gleaned by the stock of hogs. Very early next spring an additional half bushel of plaster was sown to the acre over the whole field. During the spring, summer and fall, not a single animal of any kind whatever was permitted to invade the clover field, nor was any clover cut, except a very small quantity on the most luxuriant spots, for the use of the mules while at work on the farm. The next winter, however, the stock of hogs was kept in the field, which was ploughed up early in the spring, and again planted in corn. In the fall it was seeded with wheat, and in the winter sown with clover and plaster. The other fields, as they came successively in cultivation, were treated precisely in the same manner, with the exception of the standing pasture, which has never been ploughed up since the first course of crops, and of the hundred acres of exhausted land, above spoken of, which, being too poor to produce corn, was sown first with oats, and then with rye, clover and plaster, when it took its course in the regular rotation.

Now mark the result of this system of cultivation. The crops of corn on these poor hills have for several years past averaged about forty bushels to the acre, while this year's crop, on a field of 130 acres, is pronounced by competent judges to be the best in the county, on either bottom or upland. The entire field, it is supposed, will average upward of 40 bushels to the acre, while many contiguous acres can be found which will yield at least 60 bushels. I have heard some of the most intelligent neighbors express the opinion, that it was the best field of corn they ever saw. The crops of wheat succeeding corn, though improving every year with the progressive improve-

ment of the land, have never been heavy. The average may probably be set down at from eight to fifteen bushels, the crops having been of late years very materially injured by rust. Mr. Weaver's object is corn, of which immense quantities are consumed by his iron establishment. Were wheat his staple crop, he would sow it upon a clover ley.

Mr. Weaver informs me that clover did not succeed well on his new ground until it had been well cleansed by his second course of crops. It is now generally very heavy. His fields were at first much infested with sorrel, which has at length been almost entirely extirpated. Mr. Weaver regards it as all-important to the success of his clover, that it should be plastered, at the rate of half a bushel to the acre, about the time of sowing the seed. He sometimes even strews plaster on his wheat in December or January, previously to sowing his clover seed. He attributes the rapid improvement of his soil to the shelter afforded to his land by the thick growth of standing clover, as well as to the heavy coat of vegetable matter which it enables him to plough under. If clover is sown for the improvement of the soil, he regards it as a great error to graze it at all. He contends that his standing pastures, which in a few years are covered with white clover and green-sward, yield him more and better pasturage for his cattle than his clover fields would afford. Consequently he never ploughs them up.

No lime has ever been applied to this land, nor any manure, except a few loads annually from the mule stable to the poorest spots. The improvement has been effected exclusively by the use of clover and plaster. The land, as steep as it is, does not wash—a result which Mr. Weaver attributes to his deep ploughing, and to the large quantity of long vegetable matter the soil contains, which binds it together, and at the same time keeps it loose and porous, enabling it to absorb and retain a large quantity of water.

Mr. Weaver lays great stress on applying plaster to his clover fields, either in the winter, or very early in the spring, that it may be thoroughly dissolved by the early rains. He attributes much of the benefit he has derived from the use of plaster to his practice in this respect, in which he says he is sustained by Prof. Liebig. Plaster, it is well known, absorbs a large quantity of water, and does not operate on growing plants until it is dissolved.

Mr. Weaver's mode of cultivating corn is as follows: In the month of December he sows one bushel of plaster per acre upon his clover field designed the next year for corn. He prefers this mode to plastering his corn in the hill, as more beneficial to the corn and to the land. About the 1st of March, and not earlier, for Mr. Weaver prefers spring to winter ploughing, being more recent, it leaves his land looser and in better order for a crop, he commences breaking up his corn ground, as deeply as possible, with McCormick ploughs, drawn by two stout and fat mules, running around his hills, so as to throw all the furrows down hill. About the 1st of April he lays off his ground in rows in the same direction, 4½ feet apart, and drills his corn very thick, as he never replants. His usual allowance is a bushel of seed to five acres. With this quantity of seed he has never failed, notwithstanding the depredations of the grub worm, &c., in obtaining an abundant stand of plants. He commences ploughing his corn with the ordinary shovel plough, as soon as he has finished planting, by which time his first planting is generally well up. He ploughs and hoes twice, thinning at the first hoeing to the distance of about 2½ feet in the row. This is all the work his corn ever gets, and he always lays it by before harvest. He endeavors to finish working his corn as early as practicable, in order to injure the roots as little as possible. With this cultivation his corn field, under his system of improvement, is kept throughout the season both clean and loose—the great points in the management of the corn crop.

This year Mr. Weaver has 200 acres in corn. He commenced ploughing the 1st of March with six McCormick ploughs, drawn by two stout mules each; and, with the assistance of his overseer and six additional hands, he finished planting the whole 200 acres by the 7th of May, having in the meantime, with the same force, broken up and seeded ninety acres of oats. Since planting, the whole 200 acres of corn have been cultivated by twelve hands, six ploughmen and six hoe hands, and six mules, and was laid by at harvest, about the 1st of July. Seventy acres of the corn on the home farm were ploughed and hoed only once, the corn having been previously harrowed in the row with heavy two-horse harrows. This field, which was a clover ley, will probably yield about 40 bushels to the acre. Mr. Weaver confidently estimates his entire crop of corn this year at not less than eight thousand bushels. His 90 acres of oats were supposed to average between 40 and 50 bushels to the acre—making, with his corn, an aggregate crop of twelve thousand bushels of grain, as the product of the labor of 12 hands, with the above-mentioned teams, for the brief period of four months. His is what I would call very energetic and successful farming. Is it excelled, or even equalled, by any other farmer in the United States, under any thing like similar circumstances?

Mr. Weaver has a field of 40 acres on his home farm, which he cultivates for two successive years in wheat, and two in clover for hay and seed. His first wheat crop, on the clover ley, has averaged, by actual measurement, thirty-six bushels to the acre, weighing 60 lbs. to the bushel. The second crop is never as heavy as the first. He has frequently made two hundred barrels of flour from his wheat crop on these forty acres—being an average of twenty-five bushels of wheat to the acre. Mr. Weaver does not object to taking several successive crops of corn or wheat from the same land, *provided it is rich.* He contends that it is necessary to take two successive crops of wheat from his clover field, in order to cleanse and pulverize it sufficiently to secure a good stand of clover. It should be stated that considerable quantities of manure from Mr. Weaver's barn and stables are applied to this field, on the young clover. Mr. Weaver uses all his manure as a top-dressing to his grass lands and clover lots. He disapproves the practice of ploughing under manure.

Mr. Weaver's standing pastures are the finest I ever saw, consisting of a most luxuriant growth of white clover and green-sward. The only objection to them is, that they are too much infested with "rich weed," as it is termed, and thistles,

which Mr. Weaver has not had time this year to destroy, in consequence of his unusually heavy crops, and the destruction of his iron establishment, saw-mill, and a long line of fence, by the July freshet. He fattens upon them a number of bullocks, besides keeping a large dairy stock of very pretty cattle.

Mr. Weaver's stock of every kind, horses, of which he has very few, mules, cattle and hogs, are of a very fine quality, and are all kept constantly fat—the most economical and profitable mode, as Mr. Weaver contends, of keeping stock. He crushes all his corn for stock-feeding in the ear, and he considers his crushing machine as the most profitable upon his estate. PLOUGHBOY.

Rockbridge Co., Va., August 29, 1842.

SALT FOR THE GRUB WORM.

From the New Genesee Farmer.

Mr. Colman—In examining a neighbor's field of corn, I perceived some of it cut off by the grub worms, and deemed it best to examine my own. To my surprise I found they had been destroying my own at a great rate; and had made their way into the garden and were engaged in cutting off the cabbages at the rate of four or five every night. It appeared that they did not touch them by day; and when I went out in the morning I found my cabbages gnawed off close to the ground. I first applied ashes to the hill, but without effect; then soot, but it was like the wind and did not affect them. Scotch snuff was then recommended to me, but it availed nothing against them. The June number of the New Genesee Farmer, however, arrived about this time, in which it was stated that salt was so disagreeable to the grub that it would effectually protect the corn and cabbages. I had tried every other preventive which I could hear of, and determined to make an experiment with salt. I applied, therefore, about two table spoonfuls of salt to each hill of corn or cabbage, and laid it so as not to touch the stalk or plant. Not one has been molested by the worms since, though they have begun to eat the weeds in the vicinity, to which I do not make any strong objection.

I send you this statement for the benefit of farmers. From a three years' subscriber.

Yours truly, R. H. Jr.

East Bloomfield, Aug. 6, 1842.

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Lands in the vicinity of the sea, where sea-weed and sea-wreck are easily obtained, are, with few exceptions, essentially benefited by the application of sea-weed, rock-weed and kelp, either simply spread upon the grass land or spread and ploughed under. Much of the benefit in these cases is supposed to be due to the salt with which these grasses are impregnated. We have often applied them with the most decided advantages. One of the best farmers of New England, living near the sea, assured us that he estimated the value of salt hay, that is, hay cut upon lands customarily flowed by the tides of the ocean, as equal to five dollars per ton as a top-dressing for his grass land. We have known, likewise, upon six acres of land, dressed chiefly and most liberally with rock-weed gathered on the sea shore, a crop of upwards of twenty-nine tons of hay, weighed, when well cured, at the town scales, to be taken in one year; and we have been familiar for years with a field of about forty acres, annually manured with rock-weed, kelp and sea-wreck, where the ordinary yield was estimated at 120 tons upon the forty acres; and as this hay was almost wholly carried to the market, there could be no essential mistake in the estimate.

These facts present the subject of experiments with salt as a manure as matter of great importance; and as the cattle in the interior, remote from the sea influences and atmosphere, require frequently this condiment or seasoning of their food to be given to them, may it not be inferred from analogy, that lands remote from the sea may be in some degree deficient in this element of fertility, and receive an equal benefit from its application?

The use of salt as a manure is not new at all; but while it has been fully settled that a certain amount is almost invariably beneficial, any excess is directly pernicious. To determine the safe medium is greatly to be desired and can only be ascertained by repeated experiments judiciously made; and in which all the circumstances are carefully noted.—*Ed. N. G. Far.*

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Since sending to the press the communication of R. H. Jr., on salt as a protection against the grub worm, we have received the subjoined, confirmatory of the foregoing, which we have much pleasure in inserting, and beg that we may again and often hear from our correspondent.—*Ed. N. G. Far.*

Extract.—London, Canada, 15th August, 1841.

I should be glad, through your columns, to thank the individual for his article on applying salt to plants to kill the grub, (not the gentleman who recommended a table spoonful to each plant, but the one who applied it to the plants at the rate of a bushel to the acre). Previous to reading this article, I had tried several things and had planted over and over again and again, but my plants were as quickly destroyed, and I was about to give it up as a failure, when your number came to hand and I saw the article on salt. I immediately put about a pinch to each plant, which I repeated a second time, and I had no more grubs. We had, however, at this time moist weather.

On mentioning this remedy to a friend, he said he could then account for a fact, which before had to him appeared a mystery. It was this: when he set out his plants (cabbage) he watered them with water from a salt-pork barrel daily, for about a fortnight, during which he had no grubs; but thinking the cabbage plants had sufficient root, he discontinued, and soon after he found the grub attack his plants as much as his neighbors'. The salt in season enabled me to have cabbages in season; and should I receive no other benefit from the perusal of your N. G. Farmer than this simple cure, I shall consider my half-dollar well laid out. X FARMER.

TO PROTECT LAMBS AGAINST FOXES.

We happened to be in a hardware store the other day, when a farmer came in and inquired

for sheep bells. He said the only way he could protect his lambs against the depredations of the foxes, was by putting bells on a few of the sheep in his flock; when this was done, the lambs were safe. We thought the hint worth remembering, and have put it down here for the benefit of our readers.—*Farmers' Gazette.*

SPLENDID INSECT.

From the Baltimore American.

There is now at the Baltimore Museum an insect of the *glowworm* tribe, that surpasses every thing of the kind of which we have any record. It will be recollected that the common glowworm is about half an inch long, and that it is only luminous on a portion of its abdomen. The insect at the Museum is two inches and two-thirds in length, when fully extended, and is still growing; it is one-third of an inch wide; has 12 rings, the first, the second and third of which are furnished with a pair of legs each; and like the *Scholopendra* of naturalists, (of which this is supposed to be an undescribed species,) its light is not confined to one part, put proceeds from the whole body. When examined at night in a perfectly dark place, its luminous rays extend two feet each way. In such a situation it is one of the most beautiful objects imaginable. We have seen the celebrated fire-flies of the West Indies, but they are very far inferior to this in all respects. It appears to be filled with its peculiar greenish fire of the most intense brilliancy, which is emitted through every pore and aperture of the body. As before stated, it has but *six legs*, and in this it differs from the family of Scholopendra. By day light it resembles closely, in form and color the worm that is found in many kinds of wood, particularly hickory; but it is vastly larger, and its head is also different, being much smaller and of different form. The head is capable of being retracted or drawn entirely within the first ring. Probably this description will enable some naturalist to astertain what it is. The insect was found near Deer Creek, in Hartford county, in this state, on the surface of the ground.

CLOVER HAY.

To the Editor of the Farmers' Register.

Allow me to call the attention of my brother farmers to two articles published in Vol. i. of the Register, the first at page 169, on clover hay, the second at page 162, by C. W. Gooch, on hay making. In the management of my clover hay this year, I followed strictly the instructions therein contained, and I have every reason to be satisfied with the result. The hay is sweet, with green stems, cured without loss of leaves and blossoms, and is eagerly devoured by the horses. Notwithstanding my two great disadvantages of bad weather and great distance of the clover field from the homestead, the whole crop was secured with less trouble and loss than it could possibly have been done by any other mode of management. As many of your present subscribers may not have the first volume of the Register to refer to, I will briefly state the plan I pursued.

The mowing was commenced each morning as soon as the dew was off. The clover laid as cut in swath, until about 2 P. M., by which time it was fallen or wilted. The cocking then commenced, and all was put in cock which had sufficiently wilted, say all that was cut prior to 3 P. M. The cocks were made about 4 to 4½ feet in diameter at the base, and about 5 feet high. When about 3½ or 4 feet high a *skewer*, as recommended by Mr. Gooch, was run perpendicularly into each, and the hay cocked upon it. In cocking, the hay was left loose and light. The object of the skewer is to prevent the cocks being upset, or the tops blown off by high winds, which it did far beyond my fullest expectation. I did not use the skewer at all the first day of my operations. On the second a storm of wind and rain came, and the top of nearly every cock was blown off. After adopting the use of the skewer, which was immediately done, there was not a single cock injured by wind. Besides, with the skewer, the cock can be built higher, and the hay seems to remain looser, and thus permit a freer circulation of air. I think the use of the skewer a matter of the utmost importance. The second and each succeeding day, as soon as the dew is off, the mowing is again commenced, and in two or three hours afterwards the women begin to put into cock the clover cut on the latter part of the previous day, and by 2 P. M. they get to the cutting of the same morning. My object in always waiting till the dew is off, before beginning to cut, is to save all trouble of turning it, for it is necessary when put into cock that it should be free from any dew or rain water.

This mode of curing hay is much the safest in bad weather, for if a rain comes after the hay is in cock, it does not penetrate so deep but that it will readily dry again, and if it comes before, the clover being in a green state is very slightly damaged. After standing in cock four or five days, if the weather is good, the hay is ready for housing. I have begun the third day to put it loosely in open lofts, without damage. The only loss I sustained this year with all the disadvantages of a very wet season, was in the very bottoms of the cocks. Where the hay remained long in contact with the wet earth, it became mouldy. The cocks were always opened, and the hay exposed to the sun two or three hours just before being hauled to the house or stack.

For skewers I used tobacco sticks, which are four feet long, sharpened at each end. R. J.

ON THE EFFECT OF CARROTS ON HORSES.

From the New Genesee Farmer.

Sir.—In answer to a query in your excellent paper of the 10th inst., respecting feeding horses on carrots, I am unable to give your correspondent any lengthened experience on the subject; but since I have given my horses (twelve in number) carrots, I have not perceived any ill effects from them, neither have I ever heard the root accused of injuring horses' eyes before; but the chief reason of my replying to your correspondent, is to inform him that the parsnip, a root having great affinity to the carrot, is thought to have this effect, as he will perceive from the following quotations from Quayle's Agriculture of the Islands on the

coast of Normandy, drawn up for the consideration of the late Board of Agriculture. Under the head, Parsnips in the Island of Jersey, he says: "Horses eat this root greedily, but in this island it is never given to them, as it is alleged when kept on this food their eyes are injured." Again, in the Island of Guernsey, he says:—"To horses, parsnips are frequently given, and have the property of making them sleek and fat; but in working, they are observed to sweat profusely. If new, and cut sufficiently small, no other ill effect results, except indeed, at one period of the year, towards the close of February, when the root begins to shoot; if then given, both horses and horned cattle are subject on this food to an inflammation in the eyes, and epiphora or weeping; in some subjects perhaps producing blindness." Trusting the above extracts may prove interesting to your correspondent. I remain, &c.,

A DEVONSHIRE FARMER.

DOMESTIC FOWLS IN WINTER.

From the Albany Cultivator.

One of the greatest errors that prevail in the management of the domestic fowl, and one which must be destructive of all profit, is the common practice of leaving them to "shirk for themselves," during the winter months. There is no animal on the farm that better repays good keeping than the hen, and with it, the rest, none that affords so much profit on the capital employed. The hen should have a close warm roost, for there are few creatures that suffer more from the cold than fowls; they should have a box of gravel, sand, ashes, &c., for them to roll and dust themselves in, to prevent the attacks of those insects to which fowls are subject; they should have access to pulverized limestone, or limestone gravel, as this will give material for shell, and contribute to the health of the hens; they should have abundance of water, clean and pure, for few animals will drink more frequently or eagerly than the hens, if water is within their reach; and no one need expect healthy fowls, or a plentiful supply of eggs, who does not pay strict attention to their supply of food. Indian corn, peas, buckwheat, oats or barley, may be fed to fowls. Potatoes, steamed or boiled, are excellent food for them, but must be fed while warm, as fowls will not eat a cold potato unless driven to it by hunger. Fowls should have access to a warm yard in the sunny days of winter, as warmth is particularly invigorating to them. If confined for any time in a close ill-ventilated room, they will become diseased and feeble, and will require extra attention to repair the evil generated.

KILLING WORMS.

Hellebore, it is well known, is an active poison, and fatal to most animals, and in the form of the powder of the shops, or in a strong decoction, has proved a most efficacious agent in freeing gooseberry and currant bushes from the myriads of worms that at times infest them. If used dry, the powder is dusted over them from a flour box; if in decoction, from the nose of a fine rose watering pot. A writer in the Gardener's Chronicle, says that he mixed the powder with soap suds, watered his bushes, and in six hours the bushes were free from worms, they having fallen dead by thousands. Might it not be used to destroy other worms as well as these?—*Cultivator.*

RYE FOR WINTER AND SPRING FEED.

To the Editor of the Farmers' Register.

On opening the Register this morning, the first article which met my eye is of much importance—sowing rye for winter and early spring feed. I have been an eye-witness of its beneficial results. Gen. David R. Williams was one of the very best planters on the waters of the Great Pee Dee, and was the first to turn the attention of the planter to the improvement of his lands in this section. He was not only the best, but decidedly the neatest and most systematic I ever knew. I was frequently on his plantations. He, years before his death, made a communication to the editor of an agricultural paper in Charleston, S. C., if my memory does not betray me, to this amount: Sowing largely of rye and oats; the rye somewhat pastured in the winter and spring, the stock taken off in time to permit the rye to recover from the effects of grazing, so as to give a fair remuneration in grain. His work horses and other stock permitted to gather the grain (rye and oats) at maturity, leaving the straw on the lands. The general always considered his lands as benefited—his stock certainly was, and with truth particularly the hog—portions or the entire field was frequently sown in pease. The general was the first to establish any thing like a regular system of penning his stock winter and summer. I consider him as great a loss to the agricultural community of Pee Dee, as to the state, in a political point of view. His industry, ardor, good judgment, fund of useful and practical knowledge, urbanity of manners, together with the neatness of every thing by which you were surrounded, made a visit to his plantations a most delightful recreation. But I did not set out to eulogize the general, but to use him as authority. As it regards the rye, oats and pease, they *all* met his approbation, (for he practised the use of them,) as improvers of the soil, and, to a considerable extent, the rye, as beneficial to stock, both for winter and spring grazing, as well as in the manner above stated. And here, sir, where we are unable to have our clover fields, as with you, small grain and pease are invaluable for stock, and where fed off on the lands, (except in our stiffest clay lands, on which the stock should not be permitted to run,) the benefits are great both to stock and lands. PEE DEE.

SHIPMENT OF BONES.

The ship Savannah recently cleared from Philadelphia, with a cargo of 400 tons of bones, which were purchased at $12 to $13 per ton. —*Cultivator.*

ON OAT HAY.

By William Steuart, esq. of Glenormiston, Peeblesshire.

From the London Quarterly Journal of Agriculture.

Having a field of about 14 acres which had been partially furrow-drained in 1839, and from which a crop of oats had been taken, to prepare for green crop, finding there were about 4 acres which required complete draining, and that it would be the better of extra working, I determined upon sowing it with oats to make hay of; this I did on the 11th March, sowing 26 bushels on the 4 acres without any dung. So soon as the flower was a week out of the shot blade, 27th July, I began mowing. The field was cut down by 30th; was made into hay and put into ricks by 7th August; and was then carted into the barn-yard, after standing a few days in rick, and put into tramp-ricks of 3 or 4 carts each, for the convenience of leading into the hay-loft. The produce of the above 4 acres was 692 stones of 22 lbs. The horses preferred this fodder to every other kind of hay; and I have now before me my farm-steward's letter of 8th instant, says, "The horses getting common oat fodder are in fairish condition, but those getting oat-hay, eating the same quantity of oats, and doing the same work, are as fat as they can be." The oat hay field, after being sufficiently drained and cleaned was sown out with wheat, getting a dunging of 20 square yards of dung per acre.

Annexed is a statement of the expense of the oat-hay experiment.

Cost of 26 bushels oat seed at 20s. per boll,	£4	6	8
Harrowing, water-furrowing, and rolling,	1	16	0
Mowers from 27th July to 30th July,	1	1	0
People working to 7th August inclusive,	0	18	6
Leading, stacking, &c.,	0	13	6
	£8	15	8
692 stones oat-hay, at 6d. per stone,	17	6	0
Leaving a clear profit of independent of the manure.	£8	12	4

ORCHARDS.

From the Memoirs of the Philadelphia Agricultural Society.

Burlington, February 5th, 1808.

Dear sir,—The opinion that clover possesses some property injurious to the growth of apple trees, had been suggested to me by several men of observation and practical information previous to the receipt of your letter of last spring. Some of my own experiments in the planting of orchards had not succeeded to the extent of my expectations, and their failure was ascribed to the cultivation of clover. I was well convinced of the beneficial effects which had been derived to the agriculture of our country from the introduction of clover, and being desirous of availing myself of its ameliorating properties in the improvement of my farm, I was alarmed by an apprehension of its interference with a favorite scheme I had in contemplation; that of enriching my neighborhood and improving my own property, by the introduction of the finest table and liquor fruits of Europe and America, into an extensive orchard establishment on my lands in the vicinity of this town. I therefore determined to ascertain the truth of the opinion by a series of experiments. These I have executed with care; and the result has perfectly convinced me, that young orchards thrive in proportion to the goodness of the soil, and the degree of cultivation bestowed on them; that the injury they sustain from grass or grain depends on the extent to which the particular growth or nature of that grass or grain may prevent the communication of moisture and nourishment to the roots of the trees from the earth or atmosphere: that so far as clover produces this effect, it is injurious; but that it has nothing in its nature peculiarly deleterious. On the contrary, its long tap roots penetrating and dividing the soil increases very much its capacity to nourish the roots of the trees; and did it not afford an inviting food to field mice and moles, it would be found less pernicious to orchards than any permanent grass, or any species of grain which shall be permitted to arrive at full maturity on the ground, buckwheat alone excepted. The point of most importance in the planting of young trees is to preserve the roots so near the surface of the earth, that by keeping the soil around them in a loose and mellow state, free from weeds, grain or grass, they may feel the salutary influence of the sun, air, and rain; the last of which in our dry climate is particularly essential to their success, for several years after planting; for this reason all kinds of fallow crops, such as potatoes, vines, and Indian corn, particularly the last, are peculiarly adapted to the first and second years' cultivation of orchards. An opinion prevails among our farmers that rye is a more pernicious crop for orchards than any other grain; for this I can see no sound reason. I am induced, from my own observation, to believe, that all grains are injurious, in proportion to their proximity to the tree, their power of exhausting the moisture, and from their color or even surface producing a great proportion of intense reflected heat. I am so fully convinced of this truth that I have the last summer caused a circle of three to six feet diameter, to be dug at two several times round every tree in my orchards, not under the plough, whether among wheat, rye, oats or grass; and although this operation when extended to several thousand trees, which at present compose my orchards, necessarily is productive of much expense and trouble, I am repaid fourfold in the increased vigor of my trees, and still more in their preservation from our summer droughts. Although I pretend to the merit of no new discovery in the cultivation of orchards, I may claim that of sparing no pains or expense in planting, pruning, and cultivating them. That you may be able to judge of my mode of treating them, and the foundation for the opinions I have ventured to offer, I have taken the liberty of extracting from my books the notes of several of my experiments, which I can venture to assert were made with care and recorded with accuracy. I have for many years derived a great degree of pleasure from the pursuit of this subject; it is in its nature calculated to afford

much rational enjoyment to an active mind, and, if I am not much deceived, will prove a source of substantial comfort and profit to the prudent practical farmers of our country. If my exertions can in any degree add to the numerous inducements which already exist, to urge our landed gentlemen to improve their estates by plantations of the finer kinds of table and liquor fruits, I shall be amply rewarded for the time and money I have expended in the pursuit.

Experiment No. 1.—In the fall of 1794-5, I commenced the plantation of an orchard on a good loamy soil and in a favorable situation. Being a novice in the business, and having no correct information, for at that time a young orchard was a perfect novelty in my neighborhood, the holes were dug very deep and narrow, with the mistaken expectation of its being necessary to support the trees. The ground was for several years kept in clover, and part of it being rather stiff, the natural green grass prevailed over the clover, so as to injure the trees extremely. The trees grew slowly; many of them have since been taken up and replaced by others planted in shallower and wider holes; the latter plantations have gained fast upon the first; and since I have had the ground around the trees dug or ploughed, the whole orchard containing about three hundred and forty trees, grows vigorously, and has a uniform appearance.

No. 2.—In the fall of 1802, I began another orchard, which in the two following seasons was enlarged to about three hundred and forty trees. These trees were large and vigorous. The holes were dug wide, and the ground around them manured highly with stable dung the following winter. The ground being in clover remained uncultivated for two years. The drought of the two following summers killed many of the trees, and the field mice which found a comfortable winter shelter destroyed many more. The orchard did not flourish in a manner which the goodness of the soil and my great care led me to expect. I determined therefore to plough it thoroughly, and to break in upon my established course of crops for the purpose of recovering the trees by cultivation. The event has fully answered my wishes; the trees now flourish with uncommon vigor and at present exhibit a promising appearance; being now so large as to be completely established and out of danger.

No. 3.—In the fall of 1803, I planted forty-five trees in a lot adjoining to No. 2. The trees were not large, but the ground being under constant cultivation they grew rapidly. None of them (one excepted) died by the drought of the following summer, which proved so destructive to their neighbors in the clover ground. It was my observation of these trees which first led me to change my mode of treating my young orchards.

No. 4.—In the fall of 1804, I planted four hundred and eighty-four trees in a clover field. The holes were dug four feet wide, two spits deep; the lower one thrown away, and its place supplied by a compost manure, composed of stable dung, a small portion of river mud and a large proportion of lime, about a wagon load of the mixture was applied to six trees; in some instances it was mixed in the holes with the earth in planting, in others it was thrown around the tree on the surface after planting. The ground remained in clover unploughed and undug the whole of the following summer. The trees put out well the first spring, but the drought of the succeeding summer prevented their growth, those which did not perish were nearly stationary. I replaced one hundred and thirty of them the following fall, since which I have replanted nearly one third more, and have kept the ground in corn for two successive years, by which means the surviving trees have perfectly recovered, and together with the replanted trees at present exhibit a uniform and vigorous appearance, promising in every respect to be a fine orchard.

No. 5.—In November 1805, I planted three hundred and eleven trees adjoining to No. 4. The holes prepared in the same manner, many of the trees large, transplanted a second time; I mixed no stable dung with the compost, which was composed of river mud and ashes with a small portion of lime. This I put round the trees on the surface, a wagon load to ten of them. The ground had been previously planted with corn. Although generally deemed an exhausting crop, I have continued it in corn for three successive years; except part, which has been constantly occupied (to adopt the language of this part of New-Jersey) in a truck patch. These trees have grown with a vigor I never saw equalled. In two years but one has died, and that was lately destroyed by the field mice; and the orchard is allowed to be the handsomest in this part of the country.

No. 6.—In November 1805, at the same time with the preceding experiment, I planted two hundred and fifty-two trees on a corn fallow; the holes prepared as in No. 5. I applied stable manure, hauled out the preceding spring, in about the same proportion around the trees. In the following spring the ground, which was in high order, having been manured with about three hundred bushels of leached ashes per acre, was sown with oats: the oats grew finely, and the trees put out very beautifully. They grew well for some time, but as the oats by their growth exhausted the moisture from the earth (which had not been dug) the trees withered, and by the time the oats ripened about forty of the trees had perished. As soon as the oats were cut I had the ground ploughed. This checked the destruction of the trees: those which had not previously perished soon recovered, in some degree, a healthful appearance, and took a second growth in the autumn. The trees replanted and the survivors of the original plantation have been dug round twice in the last season, and although the ground has been sown with wheat and is now in clover, they generally look well and promising, but in no degree to be compared with those manured with the compost of mud, ashes and lime, and kept under cultivation.

No. 7.—In October 1806, I planted part of an orchard of two hundred and ten trees, which I completed in the following December; the ground prepared and manured with ashes for a corn crop; the trees planted and manured with stable dung hauled out the preceding spring. In the spring of 1807, the ground was sown with oats. All the trees planted in December, and dug after the oats had attained to some size have grown well. Of those planted on the 24th of October, one third part perished in the following summer, which I

attribute to their being transplanted before the sap had ceased to flow. This remark applies particularly to the Hewe's crab, which continues to grow later in the fall than any other apple tree. Some kinds did not suffer at all, while the greater part of others perished. The comparative effects of the dung and mud are observable in this plantation.

No. 8.—In the month of October 1806, at the same time with the preceding experiment, I planted about one hundred and eighty apple trees on a piece of ground ploughed for, but not sowed with, oats the preceding spring. The holes were dug, and the trees manured with stable dung, precisely in the same manner with No. 7. The soil was much sandier than either of the fields mentioned in numbers 6 and 7. The ground was full of weeds and very rough. In the following spring it was manured with ashes, and planted in corn. Forty of the trees had been procured from a distant nursery, the soil of which was so stiff as to cause much injury to the roots in digging or rather grubbing them ; they were extremely short so as to leave me little expectation of their growing in my light soil. Notwithstanding all these obstacles the trees, though planted on the 24th of October, from being under cultivation have generally grown finely, and at present exhibit a favorable appearance, few of them having perished, and those few principally from the field mice ; but the difference between the mud and dung is here also very perceptible.

From the result of the foregoing experiments I infer, that trees planted without manure in the holes, and the roots covered with the surface earth with an external covering of mellow mud or rich mould, is the best mode for the first year. That if the ground is poor, stable manure is the least proper kind to be used, being from its nature least able to resist the destructive effects of our summer droughts, and affording a shelter to vermin equally pernicious in the winter, particularly in light soils ; that rich earth or river and meadow mud ameliorated by frost or putrefaction, either in its simple state, or mixed with ashes, lime or perfectly rotten dung, is of all others, after the first year, the best dressing, to be spread on the surface and ploughed in. That cultivation is essential to the growth of orchards, which thrive in proportion to the degree of it which they receive.

I have, under a full conviction of the correctness of these opinions, this fall planted another orchard of four hundred and eighty trees, one half of European, and the other half of American kinds, in a light, sandy soil, with two cart-loads of meadow mud, spread in a circle of about 10 feet diameter round each tree on the surface of the earth. This ground I mean to cultivate in corn and other fallow crops for two years, when I hope the trees will be sufficiently established to admit of winter grain and clover. This is the mode I prefer from my past experience, and I have little doubt of its complete success, especially if the further precaution of digging once or twice round each tree in each season is attended to (whether the ground be sown with grain or clover) for two or three years. It may not be amiss here to mention, that I do not include buckwheat in the pernicious list of grains, because it keeps the ground in a loose state, and ripens at a season of the year when no injury is produced by it to the trees ; and from its peculiar growth and color, I doubt whether buckwheat ripening even in July, would produce a sufficient degree of reflected heat to be injurious to an orchard. I am, dear sir, with sentiments of esteem and respect, your obedient servant,

WM. COXE.

SOME ACCOUNT OF THE GREEN-SAND EARTH OF GLOUCESTER AND SALEM COUNTIES, NEW JERSEY, AND THE EFFECTS AS MANURE.

By the Editor.

The New Jersey green-sand earth, and the beneficial and wonderful effects produced by its use as manure, have long been subjects of interest and curiosity to every person accustomed to read or to hear of the progress of agricultural improvement in the United States. There were other additional reasons, (which will be obvious to all readers of the past volumes of the Farmers' Register,) which made me take especial interest in this subject, and to seek information thereupon, as I have done for a long time past, from every source offered by publications. Still, all such information, taken together, seemed to me loose and vague, and deserving but little confidence; while the reports and statements of practice deemed most authoritative were manifestly erroneous, to my judgment, and serving to deceive, in their reasoning from facts, even if the facts themselves could be relied upon. The only truths which seemed certain, and these taken in the general, were that the green-sand earth of New Jersey was valuable as manure, had been extensively applied, and had in very many cases produced great improvement to the land and profit to the farmers. The error or deception which was indirectly (and perhaps undesignedly,) but not the less certainly conveyed, by the general and combined purport of all the published statements consisted in the omitting to state the particular exceptions to the above general positions—and which exceptions, even before my having any direct evidence or even report of their occurrence, I was well convinced *did* exist, and were important in every aspect. And much more of delusion had been produced in Virginia, through the high, though unmerited authority of the geological report of that state, by its author's assuming the received opinions of the fertilizing effects of the green-sand earth in New Jersey as entirely applicable to the green-sand earth and the soils of Virginia. In advance of or absence of all facts, this would have been a legitimate and fair inference. But not so, as it was made and has been long persisted in, in opposition to all existing testimony of known facts, or in neglect, or omission and contemptuous disregard of all known facts and practical experience.

Deeming, from every thing yet read, that there would be no means of obtaining the correct information desired except by personal examination, I determined to visit the green-sand region of New Jersey ; and to make this personal inspection, and to have opportunities for making personal inquiries, formed the sole objects of a journey from my distant place of residence.

Even when on my journey, and when making

general inquires as to the best mode of directing more particular inquiries, I heard repeated, by intelligent and highly respectable gentlemen, and who were residents of New Jersey, but who were not farmers, such accounts of great improvements made, as very short subsequent observations showed to be very erroneous or at least requiring to be taken with much limitation. Still I knew that even after arriving on the ground, and seeing the deposites of earthy manure, and the land and the crops for which it had been used, I must rely much less on what I could see myself, than on the explanations and comments of other persons. Therefore, it was the most important means for my object to find persons whose experience, judgment, and perfect respectability and veracity could leave nothing (except unavoidable mistakes and errors of judgment,) to impair the value of their testimony. In my search for the aid of such testimony I deem myself very fortunate, and altogether successful.

As soon as I arrived in Philadelphia, I called to make the personal acquaintance of Josiah Tatum, the proprietor and one of the conductors of the Farmers' Cabinet. I found him, even more than was previously expected, well qualified, by his personal and intimate acquaintance, to direct my course, and also ready to aid me by his kind and very useful attentions. He had been long, and until very recently, a resident of Gloucester county, and a part of the region in question, had been there a practical farmer, and had a general knowledge of the land of the neighborhood, and of its residents and cultivators. He offered to accompany me forthwith, and to make me welcome among his friends; and the same evening we were among them, in the neighborhood of the village of Woodbury, in Gloucester. The persons sought, and who most kindly aided my examination by their company and information, as well as by their kind hospitalities, were like my brother agricultural editor, Josiah Tatum, all members of the plain and estimable society of Friends, or Quakers; which connexion, to me always serves, in the absence of other testimony, as indicating solid worth of habits and character. William R. Tatum is the proprietor, and Benjamin Whitall the manager for his father, of their respective well cultivated, and highly improved farms, which are large for that part of the country, being each from 160 to 175 acres of arable and meadow land; and they are good and successful farmers in general, as well as extensive and regular buyers and users of the green-sand earth as manure. Both have made great improvements by the use. Joseph Whitall, the aged father of Benjamin, and long the proprietor of the farm, was so infirm and so unwell at the time of visit, that I feared to fatigue him by too many questions; but still, what he stated was especially interesting and valuable, because of his very long experience and general acquaintance with the subject. I may be permitted to add that all these four were intelligent men, apparently well instructed by education and reading, and of good general information. The experience and good judgment of the three who were yet farmers, as to the particular mode of improvement concerning which I was seeking information, were sufficiently evidenced in the success visible on their well improved farms.

The farm belonging to William R. Tatum is on the small tide-water creek, which extends from the Delaware to Woodbury; and of course his land is below the head of tide, and also is off from the true green-sand formation or deposite, which stretches nearly through the state just above the head of the tide in the creeks running into the Delaware. The position is therefore precisely the reverse of the green-sand deposite of Virginia, which is wholly in the tide-water region, and terminates precisely with it on the western side. The farm of Whitall, and all the others visited in this neighborhood, except Tatum's, were above the head of the tide-waters of the creeks, and all within the distances of from one to six miles south-east of Woodburry.

The first of the diggings reached and examined was on the farm of Joseph Whitall. This is very different from and deemed much inferior to the usual and most highly prized green-sand earths, though called by the same improperly applied name of "marl." It is a clay of smooth fracture and nearly uniform texture, almost black, or of dark plumbago color when newly dug and moist, but approaching to pale blue or lead-color, when dry. When cut by a knife, a smooth surface is left, as in fine clay or clay marl. It has many shining particles of mica diffused throughout. Some small fragments of shells are visible —but not enough to make two per cent. of the mass, and more likely not one per cent.; and therefore this ingredient can have no appreciable effect as manure. This earth I presume is what Prof. H. D. Rogers, in his Geological Report of New Jersey, terms the "black micaceous sand."

The next digging visited was near the road to Blackwoodtown. The earth lies about three feet, or less, under the level surface of a wet meadow, and above the green-sand earth is bog iron ore. No benefit to the soil has been observed from the close neighborhood of this manuring earth below. This deposite is something like that of Whitall's, but has more of green-sand, the granules of which are plainly visible to the eye in part of the earth, without being separated for examination.

The third body seen was Cooper's, at Good Intent. This was formerly used by neighboring farmers as manure, and to benefit, but has been abandoned since better and as accessible beds have been opened. This kind approaches somewhat in appearance to the upper and poorer parts of the bed of gypseous or green earth on James river. But this is much harder (almost stony) and more difficult to dig—is partly of a dull green changing into and intermixed with brown—and showing small spots of the same sulphur colored clay, here indurated to stone, which is so common, and usually soft and plastic, in the green earth of James river.

The next three are of the true and most valued green-sand earth, here called "gunpowder marl." This earth (that is the lowest and best stratum of it) seems to be composed almost entirely of the superficially black granules, which give name to the earth—and which, though appearing to the eye like coarse black sand, are easily mashed on the finger nail, or on white paper, and thus shown to be in texture a fine soapy clay, making a bright green smear. There seem to be barely enough of other ingredients in the mass to hold these

granules together; so that it is difficult to dig a solid lump and prevent its crumbling into a coarse powder of the separate grains. Marshall's, Heritage's and Bee's earths, all of which have been regularly and largely dug for sale, agree in character. The several upper strata differ. Of Marshall's, the upper part is grayish, and though less prized, is bought at a lower price (12½ cents the load) by farmers who have to carry it only a mile or so. Of Heritage's and Bee's, the upper strata seem poorer, and more like the poor earth of Cooper's. Still these are also used by the farmers who buy the earth by the superficial measure, and who thus get the poorer upper part for nothing but the labor of digging.

Bee's earth (that is, its lower and best stratum) is reputed to be of somewhat less value as manure than the two preceding. Yet it appears as rich in green-sand to the eye, and has been so reported, (within an inappreciable fraction,) by the geological surveyor.

The seventh body examined is very near the last, and also appears to the eye to be nearly or quite as good. Yet it has been used largely, by persons entertaining at first no question of its equal value, and found to be totally ineffective.

As to the high and just appreciation of the best of these earths as manures, there can be no question. The very general use made of them, the prices at which they are purchased, and the distances to which they are transported by very many farmers, furnish full and satisfactory proof on these points. Nevertheless, when proceeding to inquire into details, and to endeavor to ascertain and fix correct general rules by comparing particular facts, the inquirer will be surprised and confounded at the apparent opposition of the opinions of respectable and experienced persons and of the best authenticated facts. The cause and manner of the action of this earth as manure seem indeed to be incomprehensible in all respects.

The agricultural public have been egregiously deceived by the general purport of the published reports of the use and effects of this manure. Even if all the particular statements were true in themselves, (which it is not my design in the least to call in question,) still they led readers to very false deductions, because they were merely statements of success, and generally of the greatest known success, and of unusually small dressings of earth, without being accompanied by even so much as a hint of the existence of the numerous exceptions and opposite results. If these writers, had told of the cases of entire failure, or of mininum effects, in company with the maximum products to which they confined their testimony, or if the heaviest applications had been presented as prominently as the lightest, their readers might have at least had a chance to guess at something like the truth. As it is, every thing that has been published, from the ambitions and dignified reports of geologists, down to the most unpretending and concise communications to an agricultural paper, have served to mislead rather than to inform, as to general results, and to spread as much of error as of truth. The well established and unquestionable benefits of this manure are so great that they need not the aid (even if such aid could be ever desirable or excusable) of deception, whether to be effected by the bolder course of the *assertio falsi*, or merely the more usual and cautious and equally effective *suppressio veri*.

As to general results, I also could tell of many wonderful effects, and great profits, and of such (in their visible effects) as I have personally witnessed the proof. Sundry such results I have even this day seen and of many more have I heard, upon authority as satisfactory to me as would have been my own personal viewing. But the exceptions to the operation of each particular kind of earth, or found on each one soil, and in each man's practice, were stated to be not less numerous, and as remarkable, and inexplicable.

For my facts to be stated in regard to this neighborhood I shall be entirely indebted to the four persons before named, and in whose intelligence, sound judgment, and experience and opportunity for observation, as well as veracity, I have every reason to rely fully. All of them have been raised and have long lived in this neighborhood; all have been, and two of them still are, active and practical cultivators and users of this manure—and all are fully convinced of its great benefit and profit.

This earth is mostly applied in winter, when there is most leisure time; and on grass land, and as top-dressing. The quantity is seldom less than 10 tons, or as many 20-bushel loads of a two-horse wagon. The weight of the earth is 120 lbs. to the bushel when just dug, and more than 100 lbs. even after remaining and drying some months in large heaps. The usual price for the best stratum is 37½ cents the load, (of 20 bushels,) if ready dug, or from $10 to $16 the square rod, (16½ feet,) the buyer to uncover and dig for himself, and to go as deep as he may choose. The usual depth obtained of the lower and best stratum is 8 to 12 feet, below which it becomes too wet to be dug.

The surface of this part of Gloucester is gently and generally undulating. There are numerous shallow basin-shaped depressions, of moderately close soil, of which the subsoil is sometimes a hard pan of clay, but more usually sandy, and, at a few feet deep, wet, so that ditching is required to make arable or even good grass land, which is the general mode of occupation of all such places. The sandy sub-soil, from its wetness, often caves in as the ditches are dug, so as to make the operation difficult. The higher and dry intervals between all these depressions, are of all shades of texture, from sandy loam to almost pure sand. There is but little of this that could be called stiff soil, and none is at all clayey. Both the higher and lower lands are supposed to have been originally poor; and certainly so they seemed to me, judging by the parts not yet cultivated and improved, even though sometimes separated but by a fence from other ground highly enriched by the use of green-sand earth. The depressions known as "quick-sandy bottoms," and also those on hard-pan subsoil, are kept mostly in grass, and as long as fit for either mowing or grazing.

The manuring earth most valued (the so-called "gunpowder marl") produces its best effects on the stiffer soils, and especially on the lower-lying grounds, whether having a stiff clay, or a quick-sand subsoil. On these lands, (which form a large proportion of every farm in this part of Gloucester county,) the effect of the "gun-powder marl," or lower green-sand stratum, is almost

always and greatly beneficial; and that in the first season ensuing after the application in winter, and increasing for two or three years thereafter. On Joseph Whitall's farm such effects have already lasted more than 16 years without diminution. Still, the long-experienced proprietor does not think that this manure will do alone, but that it ought to be helped by putrescent manure.

On the stiffer high land this earth is beneficial, the more in proportion to the degree of stiffness of the soil. But on the very sandy soils, as most of the higher grounds are, this, the best kind of earth, is here held to be totally inefficacious and worthless. Yet on these sandy lands, the smooth bluish clay of Whitall (first described above) is remarkably and strikingly beneficial, while it is of no use whatever on the lower-lying land, where the other earth works so well. It is however applied much more heavily, where convenient to the fields. Joseph Whitall had commenced 37 years ago to use from his own bed, (the bluish clayey earth,) and as it was unluckily on his lower lands, it was without effect. The beneficial results reported to be obtained elsewhere (in Burlington county) had induced these, his first trials, and subsequently his resorting to other earths, from which he found some slight benefits. Still the general or average results were discouraging; and he, like many others afterwards, relaxed in his efforts; and it was only about 18 years ago that he learned how and where to apply each kind of earth, so as to profit by both, and by every application. One of his experiments will be stated. He applied his own kind, and also some of the best from Heritage's pits, side by side, on a part of his lower land, and in like manner on a high sandy knoll. On the former the "gunpowder marl" produced great benefit, and the other earth not the least whatever; while these effects were precisely reversed, and in as remarkable a degree, on the higher and very sandy land. On both the farms of Wm. R. Tatum and the Whitalls, the best green-sand earth is regularly and industriously used on the low lands, wagoned four and five miles from the pits where it is bought. Yet the former declares that he would not have it brought gratis on his most sandy land, deeming that its benefit would not pay him for the mere spreading. And the Whitalls, who by their practice give such strong evidence of high appreciation and preference, of their neighbors' "gunpowder marl," on low lands, have sold to other neighbors considerable quantities of their own (the black micacious clay) to be carried to their sandy lands.

But these are not all the strange contradictions which have served to cause error and loss, until they were better understood, as to *effects*, though the *causes* still remain as much hidden as ever. The seventh body of earth above-mentioned was stated *to appear* as rich in green-sand as the best, and which is very similar in all respects. Benjamin Whitall, entertaining no doubt of its value being equal to the best, worked at this body a whole winter, and put on his father's farm 150 tons. It produced not the least benefit, either soon or late. The same winter W. R. Tatum carried some of it to his farm. It remained inert for two years, but afterwards showed very good effect.

A similar fact was mentioned by Dr. Joshua Whitall, a resident of Burlington county, where it occurred. Abel Inskeep had been for some length of time purchasing and hauling green-sand earth several miles from a neighbor's digging. Afterwards he found on his own farm what appeared to be very much the same, and apparently as rich manuring earth. Of course he proceeded to use his own, and to save both purchase money and long carriage. But after full trial, and of course with every inducement to judge favorably, he was obliged to believe that his own earth was comparatively worthless, and to abandon its use, and return to the former source of supply.

It might be inferred that the chemical analysis of the different earths would show the causes of such difference of action. But, on the contrary, the analyses of chemists not only afford no such light, but if taken as directions would lead into still greater darkness. The qualities and comparative values of different bodies of earth as indicated by their chemical analysis, reported in the final geological report of New Jersey, do not accord with the opinions formed of their practical operation; and in some cases, some earths which would appear valuable by their chemical analysis, have been found to be totally worthless.

It is supposed, by the chemists, that the fertilizing ingredient of this earth is the green-sand contained; and that the potash, which is one of the component parts, is what gives value to the green-sand. There is generally not a particle of carbonate of lime; and never enough to be worth consideration; and of course this manuring earth is as little entitled to its common name in New Jersey of "*marl*," as its action as manure has of similarity to either what is called marling in Virginia, or in England.

The best effects of all kinds of this earth are on grass—and the grasses most benefited by far are the clovers. Potatoes, both sweet and round, and buckwheat are also greatly improved. In cases where there was scarcely any clover on the meadows, after this earth was applied, red clover so increased without seeding as to cover the land. And where red clover does not come, white clover does. These effects are so remarkable, that some intelligent and generally well-informed persons have not been able to avoid the belief that these plants were produced without seed, merely by the operation of the green-sand earth. B. Whitall, however, thinks that the clouds of sand which are sometimes blown by high winds in dry weather, may well convey the seeds of clover from the high lands to the meadows.

Minimum effects of this manure have been already sufficiently presented, though merely in general terms, when referring to classes of cases in which these earths were either very nearly or totally inert and worthless. A few other cases of *maximum* benefits will be here stated.

On the farm of Joseph Whitall, a piece of the low land, in its poorest and most unproductive state, was dressed with 12 to 15 loads (240 to 300 bushels) of purchased green-sand earth of best kind. The land had been standing in grass, as all such land is kept generally, and for as many years together as grass remains worth mowing, or furnishes good pasture. But the really good grass here would have scarcely furnished 100 lbs. of hay to the acre, the general growth being very little except Indian grass, which is our broom grass. In the next season, clover had nearly taken possession of the ground, and the crop of hay

was estimated at 1½ tons (3000 lbs.) to the acre; which rose to 2 tons the next summer, and to 3 tons on the third season. One mowing only is taken in a year, after which the grass is pastured. A neighboring farmer, named Chew, whose farm was among those I saw, about six years ago purchased his land, then in very poor condition. The first year his supply of grass could not graze and fodder, and that badly, but two or three horses and six or eight cows. Two years ago he mowed 100 tons of good hay, and might have mowed 50 more. He had applied the green-sand earth rapidly and heavily. Though purchased from his neighbor's pits, the distance was small. He applied generally more that 200 bushels, and sometimes he gave as much as 50 tons or wagon loads, making 1000 bushels to the acre. The present general appearance of fertility of his land answers to the report of the great improvement made.

Another farmer bought a farm in the worst and poorest condition at $9 the acre, which price is held here to be extremely low. (Good land, or such as is well improved by this mode, will sell for $100 the acre.) In four years after his first application of this earth, he rented out 6 acres of the ground so improved, to another person for $150, for the raising of a single crop of sweet potatoes. And the tenant, after paying this rent, and all other expenses of tillage, &c., would have cleared $300 by his crop, if he had sold in the fall; but choosing to keep his potatoes through winter, he lost a large portion by their rotting.

With such particular facts of remarkable improvements and profits from particular applications of this earth, I might fill more space than this whole article ought to occupy. The general appearance of improvement, pointed out to me on the many farms I rode by and through, contrasted with other, and sometimes with the immediately adjoining natural and poor land, was abundantly convincing and satisfactory as to general results. And in many cases, the lines of separation, where the last dressing stopped, were seen, showing as great and as striking difference as are produced by the best effects of the calcareous marl of lower Virginia—or say from double to quadruple the products of the unimproved ground.

But it should be remembered that it has been only by long and varied trials of different kinds of green-sand earths, and on different soils and under different circumstances—and not without numerous early failures and heavy losses, that the farmers have arrived at their present degree of certainty as to deriving sure and profitable effects from particular modes of application. And even now, after such long use, my experienced and intelligent informants state that the only safe way in beginning new operations, is to try a small quantity of each available variety of earth, upon every different variety of soil designed to be dressed, and to wait for the results of these experiments to direct which manure to use, and where to apply it. The necessity of the case has had the good effect of inducing almost every farmer to be a careful experimenter; and has caused more knowledge to be thus gained, than is usual by such means. Still, I repeat, all these numerous experiments, and the long and varied general operations, have not made known any thing of the mysterious cause and manner of action of this manure, nor even enabled any safe general rules to be formed for new operations.

The price paid for the green-sand earth is the smallest part of the expense. The distances to which it is hauled are such as would astonish the most zealous marlers of Virginia. If not exceeding two miles, the distance is deemed of no account. The greater number probably haul more than four miles. In Burlington county, the greatest distance heard of to which it was known to be wagoned, as a regular business was nine miles; in Gloucester fourteen miles, and elsewhere it has been wagoned more than fifteen miles. Most of this work is done in winter, when, as the farmers say, they could do little else. My two companions, who haul four and five miles, make but two loads a day with a team; and many regular and well satisfied operators can make but one load a day, with a good team. The varying but always enormous expenses may be thence computed. Yet, though these improving farmers are numerous, it should not be inferred that all are so. Many make little or no use of this manure; and of these, some are the nearest neighbors to the diggings.

Caustic stone lime is used by the best farmers in Gloucester, who also use the green-sand earth, and sometimes the two manures are mixed together before being applied, under the belief that the effect of each is thereby increased. The farmers suppose that both produce different and independent benefits to the land, no matter which may be the first or the last applied.

But the effects of lime must be small compared to other and usual cases. Josiah Tatum, while farming in this neighborhood, applied some thousands of bushels of lime as manure, at various times, and does not think that more than a tenth of the quantity applied was really profitable. He found most benefit from lime on good medium soils, such as the sloping margins of former ponds, on which lime did better than on the stiffer land below, now drained, or the more sandy, lying higher. Joseph Whitall has used lime at different times for 25 years, and is doubtful whether the whole profit has more than paid the whole expense.

Gypsum is also used by many, and advantageously, and is supposed not to be influenced in its effect by the previous application of the green-sand earth. Gypsum acts best on the high and light land, on clover, less as approaching the most sandy, and not at all on the lower land or "quicksandy bottoms." Even where acting, J. Tatum deemed its effects as uncertain as the weather. If no rain fell for two weeks or more after sowing the gypsum, (a bushel to the acre,) it rarely acted that year; and whether acting or not the first year, no benefit from it is expected to last through the second, or to show in any subsequent season.

After a detention of some days in Philadelphia, which was not altogether fruitless as to the main object of my journey, I proceeded to examine another and a much more improved and important district of New Jersey. This is the country surrounding and neighboring to Woodstown, in Salem county. To see and learn by inquiry more of the soil and country, I travelled by stage coach, disagreeable as that mode was over the deep sandy roads of Gloucester, and in very dry and dusty weather. The steam-boat to Salem offered

a much more pleasant and rapid conveyance. Even to my transient and hasty, as well as first view of this line of travel, there was much to yield interest and information on the general agriculture of the country; but I must confine my remarks to the use of green-sand earth, and matters connected either nearly or remotely with that mode of improvement.

Except where varied by the meadows and pastures near Philadelphia and the Delaware, reclaimed from the tide, (and mostly appearing to be very imperfectly reclaimed,) the road passed, for more than twenty miles, as far as Gloucester county reached, through very sandy lands, showing, however, considerable differences of quality and variety of surface. The level white sandy lands, from Camden to the beginning of the green-sand region, in any other locality would be deemed almost worthless. But being supplied almost annually with putrescent manures from Philadelphia, and cultivated in crops of garden vegetables for that market, these deep sands are kept both productive and profitable. If limed throughout, and then dressed with the green-sand of the neighboring region, no doubt the putrescent manures would last much longer, and the lands be far more productive. The non-use of the green-sand earth, where other manures are used in such great quantities and at great expense, would seem to indicate the opinion of the unfitness of this soil to be benefited by this earth. The peculiar face of the country and soil about Woodbury, with the alternations of sandy knolls or low ridges, and shallow basins or hollows of wet, oozy land, were described in the formor part of these remarks. This kind of land did not extend many miles south of Woodbury, and the wet basins disappeared, and all the soil was dry and sandy, and becoming more undulating in surface. Still, though much of very poor land was seen here and elsewhere, no where in New Jersey did I have an opportunity of seeing the poorest grade, so celebrated as "barren sands of Jersey;" nor even any naturally pine-bearing lands. About Swedesborough, the sandy lands approached to a reddish hue, and are of much better quality, and said to be much more retentive of putrescent manures. Approaching still nearer to Woodstown, and indeed generally throughout Salem county, the soil is seldom too sandy, but varies from medium loam to clay loam. Throughout the route from Woodbury to Oldman's creek, (the dividing line of the two counties,) here and there, though but sparsely, were seen improvements made by the green-sand earth, and which were especially evidenced by good clover standing on soil that seemed too sandy to bear it at all, even if aided by all that lime and putrescent manures alone can do for such land. But it was not until I reached the neighborhood of Woodstown that these valuable improvements of land became general.

Here again I had occasion to congratulate myself as to the hands into which I fell. My first used direction led me to David M. Davis, a resident of the village, and his kind attentions and hospitality left me nothing to desire, either as to the means for obtaining the best information, or for any other accommodation and comfort that his house and other means so abundantly afforded. In addition to all that he could tell and show me of his own operations, he carried me to as many of the most interesting points for observation as could be visited during my short stay, and enabled me to see and to inquire of many of the farmers most experienced in the use of green-sand earth.

He had not been a farmer more than a few years, and for the last seven has rented out his principal landed property, and is engaged personally in mercantile business. Such changes in lower Virginia, or in any way placing farms in the hands of tenants, would be certainly ruinous to the land, and greatly injurious to the interests of the owner. But not so here. Self-interest directs to tenants a different course. And in this case, the improvements which had been commenced and well prosecuted by the proprietor in person, have been since well carried on, and nearly to completion, by his tenants. Though few persons have done better in improving land and crops and income, by using this manure, and few probably could have given me more full or correct information on this branch of agricultural practice, still Mr. Davis modestly disclaimed all pretension to the qualifications and merit of a good farmer, or one having general agricultural knowledge, and desired that disclaimer to be made to bear on all the opinions that he might state in answer to my inquiries.

Our first visit was to the diggings in Woodstown. These, though forming several properties, may be considered as a single locality, all being close together, and the difference of distance being no object to the purchaser. I found a wagon and team of six fine mules just leaving the diggings, with a load of 40 bushels of the earth. The driver informed me that the farm to which he was regularly carrying the earth was distant seven miles, and that he made three loads in two days. The farmer by whom he was employed had several other smaller teams also at work, and for a long time before, drawing the earth to his different farms; but wishing to get on faster, he had lately added this wagon and team to the hauling force.

These Woodstown diggings extend over three or four acres, all of which space has been excavated, and the green-sand earth removed. There was no digging then going on there, but plentiful signs of the extent of recent work in many large heaps, or mounds of conical shape, formed of the excavated earth, standing to dry somewhat, or wait until their different owners, who had either dug them or bought them of the laborers, should find it convenient to haul the earth to their farms. This green-sand earth was the first used in this neighborhood, and is the most highly esteemed; though it may well be doubted whether that opinion is not erroneous, and founded merely on the effects being longer and more generally known.

At Jonathan Cawley's diggings, near a mile distant from the last, laborers were then excavating. With a view of presenting actual and precise facts, rather than conjecture or general statements, I asked him to inform me how many farmers were then drawing earth from his diggings, and the distances to their several farms. This he did at leisure, and afterwards sent me a memorandum of the following statement:

4 teams were hauling green-sand earth to distances from	- - - -	12 to 13 miles
6 from	- - - - -	6 to 8 miles

6 from - - - - - - 4 to 5 miles
8 to 10 from - - - - 1 to 3 miles

From this statement of actual distances, which probably does not vary materially from what is usual at other times and other diggings, the reader may perhaps form a more definite opinion of the high appreciation of this manure, and its extensive use, than from any merely general statements.

At another locality, visited next morning, there was a scene of much greater activity seen in numerous laborers employed in every different operation of the business. This locality embraced the several adjoining diggings of Richmond Dickenson, Henry Allen, and Allen Wallace. It was indeed a busy and spirit-stirring scene; and the operations were so interesting to those engaged at work, and to me as a spectator, that I should have been glad to have spent some days there for the mere gratification thus derived, and for full opportunity of conversing freely with the industrious and zealous operators.

The proprietor of a bed sometimes digs and sells the green-sand by the load; but the more usual course is to sell it by the square rod (16½ feet square,) to laborers, who uncover the earth, dig it out, and place it in a single high mound just far enough from the pit to be safe, and then sell by the heap to the neighboring farmers. The price by the load from such mounds is 50 cents, at the Woodstown diggings and other beds of highest reputation, and 40 cents at others, (as Cawley's,) which, even if as good, have yet to be as well established in the estimation of the farmers. However, as the quantity in a heap, yielded from one pit, is estimated with considerable accuracy, the sales are generally made by the entire heap, at a somewhat less price, say 40 cents the load, by the estimate of the heap. The covering earth is thick, say usually varying from 8 to 12 feet; and one place seemed to me 16 feet. This the laborers or purchasers by the rod have to dig off, and all down to the manure that is not used to fill the adjoining and last made pit, must be removed in carts some 50 or more yards. The excavation of the green-sand earth is never begun except in the morning, and by a sufficient force to sink it as deep as can be done in the course of the day. When sunk some 10 feet in the best earth, the increase of water, and the liability of the sides to cave in, usually compel the work to be stopped, and all below that depth is lost. The proprietor sells the privilege of digging at $6, $8 or $10 the rod, according to the greater or less difficulty of the work, or the less or greater amount of good earth to be obtained. In some cases (in Gloucester,) where there was very little covering earth to be removed, the price has been as high as $16 the rod. It usually requires 16 able men to dig out a rod in a day, and heap the earth excavated. A job which I saw in operation had 23 hands, 3 of them being boys; but this was unusually troublesome. Men hired to dig in the pits, are paid 75 cents a day if found in food, or $1 or 1.12½ if finding themselves. It is heavy labor, and the greater part is performed in mud and water.

Those who are accustomed to work in or to purchase the green-sand earth, recognize shades of difference in appearance and of value, between almost every two properties. But it would be useless and tedious in this place to pretend to make such discrimination. The general appearance of the best earth of each digging, which is always the lowest and much the thickest stratum, is very much such as Marshall's and Heritage's in Gloucester, described in the former part of this article. Of the latter, however, I saw no pit then opened much below the upper part of the bottom stratum. Here, I saw them at depths of 8 feet and more. At this depth, the earth was of firmer texture than the higher part, and is supposed by the diggers and farmers to be not quite so good as the higher part, of looser or more granular texture. It is however soft enough quite through to be dug easily with spades. I observed that, as cut by the spades, the new surface was mostly left of a vivid green hue; but upon examining the lumps I found that this color was merely superficial, and caused by the spade cutting through the granules; and that when the same lumps were broken by hand instead of being cut, the fracture was as nearly black as is usual. The water oozed or flowed from veins rapidly into the pit, as is general at such depths, and the laborers were often standing mid-leg deep in mud. One man was continually employed in baling out the water, which, as worked up with the green-sand earth, by the digging and trampling, was of a dull green color mingled with whiter streaks from the admixture of clay. In fact, the water as baled out and flowing off had much the appearance and degree of fluidity that would be presented by an accidental and imperfect mixture of a bucket of green oil paint with a smaller portion of dull white or light gray color. The water remaining in the old pits, or flowing from them, deposites a copious precipitate of yellow oxide of iron.

Above this good green-sand earth, (or "gunpowder marl," or "*real* marl," as here termed,) there is generally a body of inferior quality, but which yet is bought at lower prices to be carried to the shorter distances. There is much variation of appearance in this general overlaying stratum, and as much difference of opinion in regard to different kinds. Sometimes, (as at Richmond Dickenson's diggings,) it was a brownish red, almost composed of what had been formerly shells (*gryphæa convexa*) but of which the carbonate of lime had been entirely substituted by red oxide of iron. Little or no green-sand granules visible—and almost nothing to indicate fertilizing qualities, unless it be oxide of iron alone. Still this sold at 25 cents the load, or half the price of the lower black stratum. Sometimes the upper cover is brown, and this I saw carried away in wagons along the roads at the distance of several miles from the pits. In other cases, what would appear to the eye, and also by the reported chemical analysis, to be pretty good green-sand earth, has been found worthless on trial, and is thrown away if an overlaying stratum necessary to be removed. Such is a gray layer at some pits; and a green layer at Cawley's; though the latter is just over the "callus," a very thin layer of stony hardness, which lies immediately over the lower and valuable deposite. This "callus" is a common accompaniment.

The heaps of green-sand earth when first thrown up from the pits appear black, or at least a very deep bluish black. After drying on the surface, the color is grayish or bluish green, and after long exposure, on the outer surface of some, the

earth becomes of a vivid green. This last is not liked, and the earths showing it most are thought not to be among the best. But I saw it first, and most distinctly, at Heritage's diggings in Gloucester, of which the manure is in high repute, and very rich in green-sand by the geologist's reported analysis. The many large conical heaps, of regular form and nearly equal size, but varying in color according to age from deep black to bright green, present to the eye a novel and striking display at each of the principal diggings.

There is another general if not universal accompaniment which particularly attracted my notice, as I had seen and appreciated the same at home in our green-sand earth. This is gypsum which is left on the surface in a white tasteless powder, like a dusting with coarse meal, on the outside of the drying heaps of earth. I learned that the workers and users of the earth, though not knowing what this white powder is, had formed the opinion that the appearance was most decided in the earths best for manure. It appeared to me more abundant on the heaps of Allen Wallace—though his pits have been but recently opened for sale, and the earth has not yet acquired so much credit as that of Woodstown and some other places. On part of Heritage's earth, uncovered, but not dug out, the exuding fluid gypsum had dried and formed a thin crust. I cannot but believe that this gypsum is an ingredient sufficiently abundant and general in most if not all of these earths, to add very considerably to the other and unknown causes of value as manure.

As all the diggings present the same general appearance, it would have been a waste of my limited time to visit and examine all even of those near to Woodstown. When about to leave the last one, I asked its proprietor, Allen Wallace, what was the number of farmers taking from his diggings this season. He said about 30 persons; and he supposed that the next proprietor, Henry Allen, was supplying about as many; and the next, Richmond Dickenson, furnished considerably more than either of them. I thence computed that the three, which are all close together, and forming what I count as one locality, are supplying this season about 100 different farmers. There are six localities of diggings in this neighborhood, all within a circle of six miles diameter, of which Woodstown is the centre; and all these are supplying green-sand earth largely. Add to this that there are sundry other diggings in this and the adjacent county of Gloucester, all in active operation, and some idea may be formed of the number of farms on which this improvement is now in progress. This evidence of very general appreciation would be enough to prove great value, even if the cost were less than half its actual amount.

Next, as to the cost of the improvement, as an indication of the value of the results. As has been stated, the price per load for the best kind and far greater quantity used, is from 37½ to 50 cents the load of 20 bushels by estimate, but more often not more than 18 bushels. And though many farmers buy by the heap, or dig for themselves, Mr. Davis thinks that there is not much difference between these and the first-named mode of purchase. I asked of Richmond Dickenson, what he supposed was the average distance to which all those persons hauled the manure now being taken from his extensive diggings. He answered, at first, 6 miles. Mr. Davis thought 5 miles nearer the mark, and upon more full consideration the estimate was fixed at 5 miles—Dickenson being confident that as many loads were carried from his diggings upwards of 5 miles, as there were to less than that distance. I asked the same question of A. Wallace, who supposed 7 miles to be the average distance of his then customers. This was an off-hand guess and probably made somewhat too high. Some persons from other pits have hauled as far as 15 miles. The estimate of average distance calculated from Cawley's particular statement of numbers of teams, and the distance to which each hauled, as stated above, is 5½ miles.

I heard it mentioned that some farmers have estimated that every load of good green-sand earth spread on their land, added $5 to its intrinsic or productive value; and when I referred to this, as an extravagant assertion, to Messrs. William Reeve and D. M. Davis, they both defended the position as correct, in the cases of best and most profitable known action of this manure. The reader may judge of this for himself, from the statements which I shall hereafter submit.

Here, as before in Gloucester, I found almost all persons with whom I conversed to be Quakers; and persons of that sect are so numerous, that even other persons fall into the habit of using their "plain language," as it is termed.

The general rotation of crops in this part of the country is, 1, corn, on sward or old grass land; 2, oats; 3, wheat, to which all the manure is applied in September, before sowing, and on which clover and timothy seeds are sown; 4, 5, the grass mowed and afterwards grazed; 6, pasture. The green-sand earth is generally given as top-dressing on clover, the autumn and winter after taking off wheat. The quantity of the green-sand earth applied is usually ten loads of a wagon and two horses, and when near and cheap enough, 12 or 15 loads are often applied. Every man would prefer to give more, but for the cost. Nearly all the persons of whom inquiries were made concurred in the opinion that the effects were permanent, so far as their experience or information extended; and most of them had personal experience of from 10 to 15 years. Still, second dressings are given, and in some farms the third dressings have been applied, and with new benefit at each repetition. Some few doubted the permanency of effect. Dr. Whitall, of Burlington county, informed me that it was supposed there that the effect lessened after three years.

As elsewhere, the best effects found here are on the clovers and buckwheats; the least on wheat. Wherever applied first for and just preceding the latter crop, very little if any benefit has been seen. On buckwheat the effects of the green-sand earth are very remarkable, and it is a general practice to apply it for that crop; and being done for this crop mostly by poor men, and on poor land, it is put at not more than five loads to the acre. On part of the very poor land bought by David M. Davis for $5 the acre, he applied the earth at the rate of 10 loads, for buckwheat. The land was in Indian grass (broom sedge) when ploughed up for the buckwheat. The crop made was sold at $1 the bushel, which is an unusually high price;

and the amount was enough to pay for the whole expense of applying green-sand earth, (bought and carted 5 miles,) the cultivating and securing the crop, and also the purchasing of the land itself. Mr. Wm. Reeve told me of an experiment made by a neighbor (on stiff land, worn very low) with green-sand earth, applied very thinly, and an equal quantity of drawn wood ashes, on adjoining ground. The next crop of clover was pretty good on the green-sand earth, and only a tuft here and there was large enough to strike the view on the ashed land. The value of drawn ashes as manure is universally admitted. They are brought in large quantities from Philadelphia, and sold at Salem wharf at 8 cents the bushel, and sometimes more.

Lime is used by some farmers about Woodstown, but not generally or extensively. I could not learn that its being beneficial or useless had any connexion with the fact that the green-sand earth had been previously applied, or not. Particular opinions were opposed on this point.

It is a general opinion that the use of green-sand earth "brings in sorrel," or causes its increase. And this increase is not merely such as the increased fertility of the land would cause, (as if manured by dung,) but it shows a special action of this earth to favor the growth of sorrel peculiarly. Yet it roots out and utterly destroys the growth of poverty grass, broom-sedge, and cinque-foil, which, as in lower Virginia, are the regular co-occupants with sorrel of the poorest acid soils. In Burlington county, the "bringing in sorrel" was so manifestly the effect of the green-sand earth, and so injurious to the clover crops, that the application was thereby discouraged, until it was found out that liming prevented the growth of sorrel.

As to gypsum, in connexion with or after green-sand earth, the accounts and opinions differed. Samuel Lippincott, a successful improver and good farmer, had formerly found it beneficial, but after long use the repetitions had no effect. This was before applying green-sand, which he has done since to great profit; but since the gypsum has no effect. Wm. Reeve, near Alloways town, on the contrary, finds lime, green-sand earth and gypsum, successively and repeatedly applied on the same land, to act always, and each producing a special benefit which he would not expect from an increased quantity of either of the others. Richmond Dickenson had found gypsum beneficial before applying the green-sand earth, but of no effect afterwards.

Most persons thought that the green-sand earth, in very dry seasons, burnt and injured the crop. S. Lippincott thought that on this account he had once made not more than 5 bushels of corn to the acre, on ground that would otherwise have made 75 bushels, from its previous high improvement by the use of this earth. Others thought that it was only on gravelly and sandy soils (such as Lippincott's field was) that any such injury was produced. Nobody, however, would have objected to much heavier than the usual dressings because of the danger of such injury. Lippincott had repeated his applications, and in part had given a third manuring of this earth.

As to the soils to which this manuring earth is suitable, all persons of whom I heard in Salem agreed in the belief that it acted well on all soils fit for tillage, or grass land dry enough to make good meadow or pasture. On loams, and on the more clayey soils, (which two classes comprise nearly all the surface of Salem county,) the effect is best. It is supposed to be much less on the sandy lands. But the farmers about Woodstown do not agree in the opinion of those whom I conversed with in Gloucester, that the best green-sand earth is inert, or nearly so, on very sandy soils. Josiah Tatum had stated to me the same, as the opinion just before expressed to him, by E. Harris, an intelligent farmer of Burlington county, whose judgment and experience Tatum said were entitled to great respect. Mr. Harris dissented from this opinion of the Gloucester farmers, and thought that if they had fully and fairly tried this manure on their sandy lands, they would have thought differently.

On the most sandy and barren lands of New Jersey, which, though so extensive and well known in other parts, my route did not touch any where, it seemed to be generally agreed that the green-sand earth had not been of any value, or at least had not been found profitable in use. But even as to these worst soils, Mr. William Reeve thought that the green-sand earth was only inoperative just as any and every other manure would be found to be on such excessively open and sandy soils. Yet, according to the general and vague reports of the most wonderful improvements made by means of this earth as manure, it is on these very noted "sand barrens" that the alleged effects are usually located.

The lands of Pittsgrove township were mentioned to me, by several different persons, as furnishing the most uniform and extensive case of great improvement in Salem county. The soil is of different grades of loam, and generally of medium texture. The surface is generally undulating. The original quality, or degree of natural fertility, seemed to have been good, though not by any means rich. These also seem to have been the circumstances generally of all the lands I saw in this county, except those near to the town of Salem, which are quite level and very rich, now as well as naturally. The largest landed property of D. M. Davis lies in Pittsgrove township, and may serve as a sample of the former general condition, and the more recent changes. I will therefore state what I learned of this particular property. Twenty years ago and for some years after, this land rented for $100 a year; and after considerable improvement, and as late as seven years ago, the rent was only $300. There were formerly about 200 acres of arable land, regularly cultivated in turn, and reduced to the lowest state of exhaustion. Since, 125 acres more have been brought into cultivation, and 20 acres more added to the farm by purchase, at $5 the acre—which here is held to be as low a price, and indicating as worthless land, as $1 the acre would in lower Virginia. Mr. Davis' occupancy and the improvement by green-sand earth began ten years ago, and for the last seven years the land has been in the hands of two tenants, on leases of five years. The tenants were bound by contract to apply a certain amount of green-sand; but the obligation was superfluous, as they apply much more that their obligation requires. The tenant of the larger of the two farms was bound to apply 500

loads during his first lease. Before two years had passed he had applied 1000 loads, expecting to be amply repaid in the three next years of his occupancy. The supply is from Woodstown, and the distance 5 miles. The annual rent now paid on the two farms of about 345 acres, is $1125, and the value of the land annually increasing. The proprietor furnishes rails, or materials for fencing. But the tenants are not even supplied with fuel from the land, but purchase it elsewhere. I walked through these farms, and the appearance of the crops, and especially of the clover and pasture lands, and of the heavy bullocks fatted by grazing thereupon for market, served as abundant confirmation of all that was told me of the productiveness. There remained none of the land in its previous barren state to exhibit even a specimen; but some of the like was shown me elsewhere—and certainly none could appear more worthless and hopeless of yielding profit by being enriched. These arithmetical statements of increased net annual products, made principally by the improving labors of tenants, and by their voluntary action, speak more strongly than could any expressions of mere opinion of the value and the profit made of this manure.

In company with Mr. Davis, and upon his suggestion, I visited still another and more remarkable scene of agricultural improvement. He had told me that there were to be seen on the land occupied by Mr. William Reeve, some of the best evidences of good farming and successful improvements by, or in connexion with, the use of green-sand earth. This farm lies adjoining the village of Alloways-town, and consists now of 200 acres of farming land, or the entire extent of fields for tillage and grass. The surface is more undulating than usual, but not too uneven or hilly. The soil of the farm (as of its neighborhood generally,) is stiffer than any other part of the county before seen, being a pale yellow clay, which is stiff enough to be difficult to till, and to form cracks in the surface in dry weather. By the way, it may be not amiss to mention that I saw no sign of red clay soil or sub-soil, on my whole route in New Jersey. The present growth of the farm, which is mostly clover, shows every where within the general enclosure, high productiveness and beautiful farming condition. Yet a part without the enclosure seemed to be a specimen of as barren and worthless land as I ever saw, that was capable of producing any vegetation. It had formerly been cultivated and worn out, and had long been left out of tillage. It had a few scattering bushes, and a general but thin and low growth of broom sedge. Cinque-foil and mouse-ear were also plenty, all these plants being deemed the strongest evidences of barren land. Some spots could not even bear either of these—but its otherwise bare surface was covered with a thin and hard gray crust, which seems to have no life, but which in fact is a kind of moss, indicative of next to absolute sterility. These several marks reached generally to the very fence, and when on the other side, and but a few inches distant, clover and other growths of fertile ground showed clearly that the hand of the farmer, and that but recently, had caused this striking difference of condition. Thirty acres here had been bought for $4.50 the acre. Such as is this outer and waste land, Mr. Reeve assured me was the condition of much the greater part of the farm ten years ago when the estate was purchased, and the improvement of the land was first begun. Some of it indeed was much worse. For all the steeper declivities, such as were pointed out to me, then green with thickly set clover and other grasses, were formerly naked galls.

As explanatory of and introductory to the farming operations, I will mention some circumstances which I heard from other sources, and which it is proper I should so state, lest it might be supposed that I had them from one of the parties concerned. Of these, I saw Mr. William Reeve only, and all that I asked of or heard from him was in regard to the farming operations, of which he is the sole director. The whole property and business are much larger. Besides the farm, there is a large milling business, for sawing timber as well as grinding grain, and a vessel and boat-building yard. The property is owned jointly by three brothers, who severally manage the three different departments, and all of them in a manner which shows great energy, intelligence and good judgment, and successful results. The three brothers came from Burlington county, where the green-sand earth was first used, and has been longest and best known, and their father and uncle were among the early improvers.* The varied and yet combined operations of these brothers have been ably conducted—and they have had a marked effect in improving the operations of their whole neighborhood, by their example and by the many indirect modes by which every such individual influences the conduct and well-being of all around him. Every such man, in any honest and useful exercise of industry, but more especially as an improver and cultivator of the soil, is a blessing and a source of profit to all his neighbors and to his country at large. And every such farmer as I take William Reeve to be, is worth more to the community among whom he labors, than would be ten-fold the amount of all his property if distributed among them.

To sustain the teams necessary for their milling business, and transportation of their timber, it was difficult to procure hay in so barren a district. This want was a main inducement to go to farming and to improving. To commence this, on such land, was of itself matter of surprise to the neighborhood, which was heightened to wonder and to ridicule, when among the first commenced operations, were the purchase and application of 1000 bushels of lime.

The first year of their farming, 1833, the whole land was first under one general enclosure, and all the grass was mowed that could be possibly obtained, as hay was the most important object. The whole product was 5 tons only. In reply to some of the jocular taunts and predictions of their neighbors, Mr. Reeve offered to bet that he would double the first year's product of hay every year, until the amount reached 100 tons from a single mowing. In seven years, the crop amounted to 225 tons, besides the then keeping a fine stock of grazing cattle, and the regular tillage of grain crops.

* Mark Reeve, the uncle, was the person whose opinions were referred to as authority by Judge Peters, in a passage quoted in my account of the "gypseous earth of James river," Farmers' Register, vol. i. p. 211

The earliest operations of tillage and improving (in 1833) was to plough 12 acres in the spring, apply stone lime at 50 bushels the acre, and cultivate in corn. The next year oats. Both crops were very good for the land. Again 50 bushels of lime were applied to the acre; and before the wheat, which was the next crop, barn-yard manure was given at the rate of 10 two-horse loads to the acre. Timothy seed sown with the wheat, and clover in the spring. The next winter, after the wheat crop, applied green-sand earth, 10 tons to the acre, hauled 7 miles from Woodstown. The crop of hay was 2½ tons to the acre; and its value was enough to pay for the whole expense of all the lime applied, charged at the cost when landed on the wharf, and that of the purchase and wagoning and spreading of the green-sand earth. This year, a neighbor offered Mr. Reeve $24 for the grass then standing on a single acre, which was refused; and he sold the grass of half an acre for $15, or at the rate of $30 the acre. This mode of purchasing grass, to be mowed and cured by the purchaser, is not uncommon hereabout. Only one mowing of grass is taken, and the grass is grazed the balance of the year, but not closely. Like his countymen generally, Mr. Reeve's rotation is 1, corn, 2, oats, 3, wheat, 4, 5 and 6, clover and timothy, for hay and grazing. But he does not limit the duration of the grass to three years, but lets it stand as long as the grass continues good, he being confident that the land improves every year it is so kept, though mowed once, and afterwards grazed moderately. He has land yet in grass that has been so for seven years, and the clover not yet near run out. In addition to green-sand earth, and the double liming, (and he means yet to lime again, and at 75 bushels for the third application,) he sows a bushel of gypsum every spring on all the clover land; and he finds distinct and remunerating benefit from each kind of manure, and from every application. He does not think that the increasing of one or two of the three kinds would supersede the necessity of the other manure. The green-sand earth, he thinks, thickens the coat of grass, and covers with it every part of the surface, more completely than the lime or the gypsum can do, either separately and alone, or together.

While looking at these improvements and hearing the details of labor, expenses and returns, it occurred to me, as it has perhaps already to my readers, the ready objection to be made—and soon after I heard it adduced. This objection is, that with the Messrs. Reeve, the fertilizing of poor land and making heavy crops is but a matter of expense in money, and that, without such means, over and above what their farm could alone supply, these improvements could not be made. That might well be; or at least the progress of improvement would be necessarily much slower, if without any disposable capital for improvement. But, however opposed to general opinion, I maintain that nothing is so infallible a test of the value of agricultural improvements, as when they are paid for in money by a judicious and well-managing capitalist and man of good business sense and habits. Such men do not advance or expend their money except for profit; and from all that I saw and heard of the character and habits of Mr. Reeve, I should rely implicitly that he would not long pursue a system of farming which he did not find to be profitable.

This farm is without the limit of the region of green-sand earth, and it cannot be had of good quality short of seven miles. Moreover, there is no leisure to haul it, except during winter, and the deep and wet clay soil then renders it impossible, except when the road is made firm by freezing. Hence this mode of manuring is slower than others; but it is designed to be pushed on every winter, as fast as possible, until all the farm has been covered, or as long as it shall be deemed necessary to repeat the dressings. This, considering the peculiar difficulties, and the careful estimates of cost and returns upon which the practice is based, and the greater ease of procuring lime and gypsum, and their excellent effects not being deemed a substitute for the green-sand earth, all serve to present, in a new and striking point of view, the peculiar and great value of the latter manure. Mr. Reeve knows of no land where the green-sand earth has been applied and found useless.

Among the many reports I had heard in advance, were conflicting statements of the effects of this earth on the naturally rich and very productive lands around the town of Salem. While some affirmed the benefit, others stated that the use of green-sand earth had been there discontinued. I had but little time left for inquiry on this head; but that little was enough to show that both reports were true. Enough applications of this earth had been made on these good lands, to show very good effects; but the distance to the nearest diggings was so great, and the supply of water-borne lime and drawn ashes so much cheaper and more convenient, that the use of the latter manures had nearly or entirely superseded the former.

The lime used here is brought from the Schuylkill, the quarries being about Norristown, Pa., and though, varying in different parts of the limestone, the whole is highly magnesian. It is this same lime which is now brought, (by vessels which come for cargoes of wood,) ready slaked, in large quantities into James river, and sold to the farmers at 8, 9, and, at highest, 10 cents the bushel. Here, in Salem creek, and so much nearer the kilns, it is never obtained at less than 10 cents, was not long since at 15, and at first was 20 cents the bushel; and then, as now, readily bought by the farmers for manure. A short time since, a friend of mine, who had bought a vessel load of this lime, and fearing danger from the magnesia suspected to be contained, brought to me a small sample, in the then partially carbonated state, to be analyzed. The operation was roughly performed by a member of my family, and the result showed 37 per cent. of magnesia. The appearance of so large and unlooked an amount alone caused me to doubt the accuracy of the process. But I no longer doubt it, as these limes have often as much admixture of magnesia, and sometimes have more than 40 per cent. Of the limestones of two of the principal quarries in Delaware, used largely and advantageously for manure, the respective proportions of carbonate of magnesia (of Jeanes' quarry) are 46 parts in the 100 of limestone, and (of Klair's) 44 per cent. These statements are reported by J. C. Booth, esq., an excellent and accurate chemist, in his 'Memoir of the Geological Survey of Delaware,'

which he made by order of that state. All the stone limes which have been longest and most largely used for manuring in Pennsylvania, and which have produced so much fertilization and profit, have been highly magnesian. So our James river farmers need not hesitate about profiting by their present cheap supply, nor fear danger from this large admixture of magnesia in the Schuylkill stone lime, when appled in their usual moderate quantities of 36 or 40 bushels (slaked) at one dressing. In New Jersey I heard of 75 and 100 bushels being used without suspicion of their being danger from magnesia; and probably most of those who applied it had no knowledge of the presence of magnesia.

I have aimed throughout this inquiry to obtain and present the opinions of others, rather than to give my own views most prominency. And when the most experienced and well-informed practical improvers differ so much on this subject, it could not be expected that my hasty digest of their opinions should be entirely free from contradictions. In truth, my own opinions have not remained the same, at different scenes of this hasty examination, nor even during the writing of both the earlier and the latter part of this account. While I have learned much as to the effects and value of this manuring earth, by my inquiries and personal examination, I have at the same time also learned that I was before, and still am, profoundly ignorant of the cause and manner of the action. I will not even presume to attempt any explanation of what appears to me so far inexplicable by any of the views yet set forth.

There seem to be important differences of action between the green-sand of New Jersey and that of James river. It is true that the latter has been usually applied by myself in very small doses, say 20 to 40 bushels the acre, while in New Jersey the quantity is usually 200 bushels and often much more. But even this great difference of quantity does not at all serve to explain the differences of results—nor do the manifest differences of the different earths, or of the soils of the different regions. So far as my practical experience has extended, the green-sand earth of James river acts precisely as does gypsum, though more strongly—is limited to the same soils, to the same crops, and like gypsum has but a temporary though more extended limit of time of action. But the green-sand earth of New Jersey while agreeing greatly with that of James river in its visible effects (epecially on clover,) seems to act on nearly all soils, on most crops, and is counted as a very long enduring if not indeed a permanent fertilizer.

All the best green-sand earths which I saw, contain no carbonate of lime, or at most and in very few cases, so small a proportion as to be of no appreciable effect. They contain (according to Prof. H. D. Rogers' statements of their contents) from 85 to 95 parts of green-sand in the 100 of earth; and the pure green-sand (or silicate of iron and pot-ash) contains from 5 to 14 per cent., or generally 9 or 10 per cent. of potash. Since the discovery of this latter ingredient was made by Henry Seybert, esq., of Philadelphia, it has been generally supposed to be the main if not the sole fertilizing ingredient. I deem that opinion extremely questionable; and, as to the green-sand earth of James river, altogether untenable. But I will not here repeat the grounds of this opinion.

The gypsum, which is certainly present in most if not all the green-sand earth of New Jersey, has not been considered by the highest authorities as being an important ingredient. Indeed it does not appear among the contents in the many analyses stated in Prof. H. D. Rogers' Report. Without claiming for it any very important agency, still it seems to me that the gypsum cannot be of so little amount or effect, as has thus been assumed. And sulphate of iron (copperas) and sulphate of alumine (alum,) which are present in some cases, need only to meet lime in the soil, or to have lime previously mixed with the green-sand earth, to form still more gypsum, by the decomposition and destruction of either or both these salts, which are poisonous to soil and to vegetation.

The following statements of the composition of some of the bodies of green-sand earth referred to or described generally in this article, are copied from Prof. Rogers' 'Final Report' of his geological survey of New Jersey.

In Gloucester—Josiah Heritage's.

"*Composition.* In 100 parts.

Green-sand, - - -	93.70
Clay, - - - - -	6.30
Quartzose sand, - -	none.

"The proportion of potash in this marl, [forming a constituent part of the green-sand ingredient,] is 10.4 per cent."

Thomas Bee's.—"*Composition.* In 100 parts.

Green-sand, - - -	92.48
Clay, - - - - -	7.52
Quartzose sand - -	none.

"The amount of potash in this marl by absolute analysis is 10.35 per cent."

Salem county—John Dickenson (now Richmond Dickenson's)

"*Composition.* In 100 parts.

Green-sand, - - -	92.59
Clay, - - - - -	7.41
Quartzose - - -	none.

"The proportion of potash in this marl, by direct analysis, is 10.4 per cent."

Allen Wallace's—"*Composition.* In 100 parts.

Green-sand - - -	90.00
Clay - - - - - -	8.00
Quartzose - - -	2.00

"The proportion of potash which this marl contains by analysis is 10.2 per cent."

Jonathan Cawley's—"*Composition.* In 100 parts.

Green-sand, - - -	86
Clay, - - - -	14
Quartzose sand, - -	none.

"The proportion of potash which analysis shows in this marl is 10.3 per cent."

Jonathan Riley's (part of the Woodstown diggings.) "Composition in 100 parts:

Green-sand, - - -	88.28
Clay, - - - -	11.72
Quartzose sand, - -	none.
Carbonate of lime, - -	a trace.

"The proportion of potash, as deduced from the green-sand, is 10.1 per cent."

James Smith's, Mannington Hill. "Composition, in 100 parts:

Green-sand, - - -	88.80
Clay, . - - - - -	10.20
Quartzose sand, - -	1.00

"The proportion of potash which this marl contains, by direct analysis, is 9.5 per cent."

All of these earths, as well as others, I saw in place, except James Smith's.

These stated contents, (as of a far greater number,) given in that report, are so nearly alike, that is difficult to believe that any difference of effects could be manifest from the difference of the amounts either of the green-sand or of the potash in the green-sand. Yet very different values are attached to the earths furnished at these localities. Heritage's in Gloucester is esteemed more highly than Bee's; and in Salem, the Woodstown earth (Riley's and Shinn's) is valued above all in the neighborhood; and James Smith's, after having been extensively used, has been abandoned as comparatively inert.

The upper light-colored green-sand earth at Mullica Hill, which, though not so rich as the best, yet contains 85 per cent. of pure green-sand and 5.50 per cent. of potash (according to the reported analysis) is pronounced by those persons who have used it for manure, to be utterly worthless. This is said to be the same green earth which I saw at Lippincott's, and also is cut through by the mail road on the hills on both sides of Oldman's creek, which makes the surface of the roads greenish, and rises to near the surface soil. Yet the soil, thus resting upon a green-sand earth, and necessarily more or less mixed with it, is very poor naturally, and shows no benefit whatever from its natural admixture with green-sand.

Also the stratum at Mullica Hill next below the one referred to in the first part of this paragraph is described in the geological report of Prof. Rogers as "a chocolate colored bed, in which about one half is the green granular matter [pure green-sand it is presumed the author means,] and one half a fine clay of a light purple or chocolate tint. This also has all the features of a good marl, though it is not reported to have any power." The want of power or feeble action as manure, of these several kinds of green-sand earth, are among the most remarkable of the many opposed and unaccountable facts which have been presented by the use of this earth.

USES OF CHARCOAL AS A MANURE.

From the American Agriculturist.

From an article on Dr. Liebig's Organic Chemistry applied to Agriculture, in the April number of the North American Review, it appears that the most valuable property of a soil is that of absorbing and giving off those vapors and gases that constitute so considerable a portion of the food of plants. Reflecting on this fact, it occurred to me, that charcoal might prove a most valuable manure; from its well known capacity of absorbing vapors, gases, and saline solutions, and under certain circumstances giving them out.

The ladies make use of charcoal in their flowerpots, from an experience of these results. At this time I did not know of its being used on a large scale. I communicated the idea to Mr. Phineas Sargent, and he remarked he did not know that it had been used as a manure; but that he had often observed the charcoal hearths were more productive than the surrounding land. I made further inquirers of Mr. A. B. Allen on the same point, and he had the kindness to furnish me Mr. J. H. Hepburn's valuable paper, "Charcoal as a manure," published in the Trans. of the Ag. Soc. of N. Y. p. 298, 1841. I was not a little gratified to find my speculations sustained by so accurate an observer.

As Mr. H. declined to enter into the chemical character of charcoal, I propose to supply that portion of the subject compiled from such writers as are within my reach.

From Ure's Dictionary of Chemistry, article Gas, we extract: "Of all solid bodies, charcoal is the most remarkable in its action on the gases. In M. De Saussure's experiment, the red hot charcoal was plunged under mercury, and introduced after it had become cool into the gas to be absorbed without ever coming into contact with the atmospherical air.

"One volume of charcoal made from boxwood absorbed of ammonia, - - 90 volumes.

Muriatic acid gas,	85	"
Sulphurous acid,	55	"
Sulphuretted hydrogen,	55	"
Nitrous oxide,	40	"
Carbonic acid,	35	"
Olefiant,	35	"
Carbonic oxide,	9.42	"
Oxygen,	9.25	"
Nitrogen,	7.5	"
Gas from moist charcoal,	5.0	"
Hydrogen,	1.75	"

"The absorption was not increased by allowing the charcoal to remain in contact with the gases after 24 hours, with the exception of oxygen, which goes on condensing for years in consequence of the slow formation and absorption carbonic acid gas. If the charcoal be moistened, the absorption of all those gases that have not a strong affinity for water is diminished. Thus boxwood, charcoal, cooled under mercury, and drenched to water, is capable of absorbing only 15 volumes of carbonic acid gas; although before being moistened, it could absorb 35 volumes of the same gas."

"Dry charcoal, saturated with any gas, gives out, on immersion in water, a quantity corresponding to the diminution of its absorbing power. When a piece of charcoal which is saturated with either oxygen, hydrogen, nitrogen, or carbonic acid gas, is put into another gas, it allows a portion of the first to escape, in order to absorb into its pores a portion of the second gas."

Charcoal, when reduced to powder, will absorb but half the quantity of gas that it would when in the lump.

The advantage of this article over every other that has been used as a manure is, that what is not actually consumed or washed away is retained on the soil, and will continue to absorb and give off the vapors, gases, and saline solutions for an unlimited period. It would therefore be an experiment worthy of trial by our western agriculturists, to make their wood into charcoal and spread it on the soil, rather than to reduce it to ashes, which at most will last but a few years.

C. H. RAYMOND.

Buffalo, Aug. 6th, 1842.

THE GEOLOGICAL HISTORY OF THE HORSE.

By Mr. W. C. Karkeek, V. S., Truro.

(From the Veterinarian.)

To trace the history of remote events, and to investigate the origin of our domesticated animals, has given occupation to the highest talents; and in this interesting inquiry, mouldering records, decaying monuments, fabulous legends, and the sibylline leaves of tradition, have yielded their respective tributes. But still the details, even of probable history, carry us back but a little way into the dark recesses of antiquity, and we soon reach the epoch when truth and fable are inseparably blended.

The natural historian and natural theologian have hitherto exclusively confined their attention to one volume of nature's history—that which relates to the present order of things; and man is regarded by them as the undisputed sovereign of the world around him—the cattle on a thousand hills are supposed to be at his disposal—the mighty deep yields its treasures to his skill—the savage denizens of the mountain and the forest are tributary to his power, and the *magna charta* for these vested rights they find in the inspired page. From the command to subdue the earth and to exercise dominion over its tenants, they draw the inference, that their only purpose was to increase his luxuries, and that they were created for no other use than that they might be subservient to his destructive propensities.

These views of the uses of the animal world, so long universally received, have been of late singularly modified by the light of modern science; for within the bowels of the earth the geologist has discovered a series of engravings, more or less injured and imperfect, yet all executed by the same hand, and bearing the manifest impress of the same mighty mind, which distinctly inform us of the characters and habits of races, some of them extinct and some still existing, which occupied its surface for many thousands of years ere man ever placed his foot on this wondrous soil, or contended with them for dominion.

To trace, then, the ancient history of the horse and his contemporary congeners, we must first take a slight glance at those engravings which have been discovered in the different strata of the earth, and which, like the brain of Touchstone, "is crammed with observation, the which it vents in mangled form."

Without embarrassing ourselves with the history of the geological epochs, we will briefly advert to a few facts—that certain families of organic remains are found pervading strata of every age, under nearly the same generic form which they present amongst existing organizations. Again, that other families, both of animals and vegetables, are limited to particular formations, there being certain points where entire groups ceased to exist, and were replaced by others of a different character. It is also a fact well to be acquainted with, that animals and vegetables of the lower classes prevailed chiefly at the commencement of organic life, and that the more perfect animals became more gradually abundant as the world grew older.

If we pass in succession from the ancient to the modern epoch—from the regions of sterility and desolation to that in which animal and vegetable life were profusely developed, we find that the first evidence of organic existence was, setting aside the infusoria, a few *fuci*, *mollusca*, and *polyparia;* these were followed by a large developement of the same order. In the succeeding period, reptiles and insects appear, with sauroid fishes, and an immense developement of vegetable life, particularly the cryptogamia class, such as mosses, ferns, &c. Large reptiles did not then prevail to an extraordinary degree at this epoch, in what are now the temperate regions of southern England, the weald of Sussex and Dorsetshire for example; but a very long time afterwards these spots were peopled by monsters of an extraordinary character, which stalked amid marshy forests of a luxuriant tropical vegetation, or floated on the genial waters. This state continued for a long period of time, when another change took place, and the country and its inhabitants were swept away. An ocean had usurped its place; and then after another long period of time, and the dry land had again appeared, it became covered with groves of forests, and herds of deer, and of oxen of enormous size. Groups of elephants, mastodons, horses, and other herbivorous animals, occupied its plains; its rivers and marshes were crowded with the hippopotamus, the tapir and rhinoceros; and its forests afforded shelter to the hyæna, the bear and the tiger.

This is the period when the horse first appeared on the stage of life, being the one subsequent to the last grand catastrophe, as it is frequently but incorrectly called, by which the earth was said to be overwhelmed,

"Ere Adam was, or Eve the apple ate."

We must now confine ourselves more closely to this particular period, being the one immediately antecedent to the present order of things.

In almost every part of the globe, beneath the present or modern alluvial soil, (which is a loose strata constantly deposited by streams and rivers,) extensive beds of gravel, clay, and loam, are found spread over the plains, or in the flanks of the mountain chain, or in the crest of ranges of low elevation: and in these accumulations of water-worn materials—termed by Dr. Buckland, *diluvium*, and by Cuvier, *alluvium*--are immense quantities of the bones of large mammalia. These remains belong principally to the mastodon and the elephant, to various species of hippopotamus and rhinoceros, to the horse, ox, deer, and many extinct genera; while in caverns and fissures of rocks, filled with calcareous breccia, the skeletons of tigers, boars, gigantic hyænas, and other carnivorous animals are imbedded. They have been found alike in the tropical plains of India, and in the frozen regions of Siberia, while there is no considerable district of Great Britain in which some traces of them do not occur. These remains are not always found together. Cuvier, whose authority I quote, says, that the *remains of the horse* have been found with the mastodon (an extinct animal allied to the elephant) in America; with the mastodon in Little Tartary, Siberia, Italy, and France; with the rhinoceros in France, Italy, and Germany; and with the rhinoceros, hippopotamus, hyæna, tiger, elephant, and a gigantic species of cervus, in Great Britain. Capt. W. S. Webb discovered the remains of the horse in a

fossil state, together with those of the deer and bear, in diluvium, and on the Himalayan mountains, at an elevation of 16,000 feet.

In South America the bones of horses of a large size have been discovered by Mr. Charles Darwin, naturalist to the Beagle, in company with the remains of the megatherium, of immense bulk, a huge mastodon, parts of rodents, and a llama fully as large as the camel.

"With regard to North America," Cuvier says, "the elephas primogenus has left thousands of its carcasses from Spain to the shores of Siberia." The fossil ox, in a like manner, he writes, is buried "dans toute la partie boréale des deux continens, puisque on en a d'Allemagne, d'Italie, de Prussie, de la Siberia occidentale et orientale, et de l'Amerique." "I may here add," says Darwin, "that horses' bones mingled with those of the mastodon, have several times been transmitted for sale from North America to England; but it has always been imagined, from the simple fact of their being horses' bones that they had been accidentally mingled with the fossils. Among the remains brought home by Captain Beechey from the west coast of the same continent, in the frozen region of 66° north, Dr. Buckland has described the astragalus, metacarpus, and metatarsus of the horse, which were associated with the remains of the elephas primogenus, and of the fossil ox. In Mr. Saull's Geological Museum, Aldersgate Street, London, there are three coffin bones, one os sacrum, and one cannon bone, from Big Bone Lock, Kentucky. In the same collection are one cervical vertebra, Herne Bay, Kent; several metatarsal, ditto, one dentata, ditto, and portions of two ribs, from Plumstead, Kent; several teeth from Banwell Cave, Somersetshire; and two teeth, and several astragalus, from Swansea, South Wales—all of the horse. With respect to Great Britain, as I before stated, there is no considerable district in which some traces of the fossil horse do not occur, in company with either those of the elephant, the rhinoceros, hippopotamus, tiger, ox, deer, or hyæna. At Oreston, near Plymouth, an immense number of bones of the rhinoceros and horse were found; and in a cave at Paveland, in Glamorganshire, those of the elephant, rhinoceros, horse, hog, bear, and hyæna, were found embedded together. In the celebrated Kirkdale Cave, Yorkshire, the contents of which have been so graphically described by Dr. Buckland, were discovered fossil bones of the tiger, bear, wolf, fox, weasel, elephant, rhinoceros, hippopotamus, horse, ox, and deer, and an immense number of the bones of the hyæna.

In the earlier ages, some of those colossal bones were supposed to belong to gigantic races of mankind, and hence the traditions of giants, possessed by every country in Europe; but it is an authenticated fact, acknowledged by all geologists, that no traces of man or his works have ever been discovered in any of the diluvium strata. Leibnitz, in his "Protogea," mentions the fossil bones of a unicorn, discovered at Quedlimbourg, in 1663. They were found in a calcareous and gypseous hill, and after being collected, a sketch was made of the animal, such as it was pretended to be; but a single glance at the sketch is sufficient to show that it was done by very ignorant hands, and taken after parts most incongruously joined. The bones of the horse seemed to have formed the principal part of the conformation, with a considerable portion of the muzzle, a piece of the humerus, a lower tooth, and an unguinal phalanx of the rhinoceros. It was supposed by Cuvier, but now denied by most of our eminent geologists, that the diluvium strata on which the animals we have described have been found embedded, was the consequence of a sudden inundation of water. It will be necessary briefly to allude to a few important facts connected with this subject, that are acknowledged by all parties:—First, that after all the strata which compose the crust of our globe had been formed, a great portion of the earth has been covered with water. Secondly, that the period or epoch which relates to this history was one of immense time, and that the whole surface was densely peopled by various orders of living creatures, some of them, as we have seen, not distinguishable from existing species. Thirdly, that great and considerable changes must have taken place since that epoch in the climate of different parts of the world; and confining our attention to our own island for an example of this, we find that there then flourished on its surface the luxurious vegetation of a tropical clime. In the course of time, however, the whole scene vanished, with various orders of living creatures then ranging the plain or swimming the lake, such as the tiger, the elephant, the rhinoceros, and the hippopotamus; while their contemporary congeners, as the horse, deer, ox, &c. were left behind. Shortly after this man appears on its surface.

When we carry our minds back to this subtertiary period—which, geologically speaking, is so recent that it may be considered as only just gone by—we receive the accounts with surprise and almost incredulity. It must be admitted, that they at first seem much more like the dreams of fiction and romance than the sober results of calm and deliberate investigation; but to those who will examine the evidence of facts, upon which the conclusions rest, there can remain no more reasonable doubt of the truth of what I have been relating than is felt by the antiquary who, finding the catacombs of Egypt stored with the mummies of men, apes, and crocodiles, concludes them to be the remains of mammalia and reptiles that have formed part of an ancient population on the banks of the Nile.

Now, if it was a sudden catastrophe or deluge which destroyed the hippopotamus, the tiger, and the elephant, how did the ox, deer, and horse continue to escape the flood of waters? Why this partial selection of its victims among the ancient inhabitants of our country? But these changes on our island are not more wonderful than the mutations that have occurred in other parts of the world. It is almost impossible to reflect, without the deepest astonishment, on the changes that have taken place on the continent of South America. Formerly it must have swarmed with great monsters, like the southern parts of Africa; but we now find only the tapir, guanaco, armadillo, and capybara—mere pigmies compared to the antecedent races. The greatest number, if not all, lived at the epoch we have been describing, and many of them were cotemporaries of the existing mollusca.

"In the Pampas," says Darwin, "the great sepulchre of such remains, there are no signs of violence, but on the contrary, of the most quiet and

scarcely sensible changes." "What shall we say," he continues, of the death of the now fossil horse? Did those plains fail in pasture, which afterwards were overrun by thousands and tens of thousands of the successors of the fresh stock introduced with the Spanish colonist?" "One is tempted," he continues, "to believe in such simple relations as variations of climate and food, or introduction of enemies, or the increased number of other species, as the cause of the succession of races. But it may be asked whether it is probable that any such cause could have been in action during the same epoch over the whole northern hemisphere, so as to destroy the *elephas primogenus* on the shores of Spain, on the plains of Siberia, and in northern America; and in like manner the *bos urus*, over a range of scarcely less extent? Did such changes put a period to the life of the *mastodon augustidens* and of the horse, both in Europe and on the eastern slope of the Cordillera in southern America? If they did, they must have been changes common to the whole world; such as a gradual refrigeration, whether from modification of physical geography, or from central cooling. But in this assumption, we have to struggle with the difficulty that these supposed changes, although scarcely sufficient to affect molluscous animals either in Europe or South America, yet destroyed many quadrupeds in regions now characterised by frigid, temperate and warm climates." The elephas primogenus is thus circumstanced, having been found in Yorkshire; and now associated (says Lyell) with recent shells in Siberia and in the warm regions of lat. 31°, in North America.

The law of the succession of types, although subject to some remarkable exceptions, must possess the highest interest to every philosophical naturalist. Some of the animals we have been describing appear to have been created with peculiar kinds of organization, suited to particular eras; and it does not seem extraordinary that their extinction, more than their creation, should exclusively depend on the nature (altered by physical changes) of their country. But as to the horse, for instance, his constitution appears suited to every climate; and we cannot account for their species being destroyed throughout the whole of the two continents of America, unless the change was much more considerable than we imagine it to have been.

It would seem, from what has been stated, that certain races of living beings and plants, suitable to peculiar conditions of the earth, were created, and when those states became no longer favorable for the continuance of such types or organization, according to the natural laws by which the conditions of their races were determined, they disappeared, and were succeeded by new forms.

The reader will observe, in the geological mutations we have briefly alluded to, that one simple inundation, one general catastrophe, is not sufficient to account for the phenomena we have described, since many alternate changes of heat and cold must have taken place to have produced these alterations on the earth's surface.

Mr. W. D. Saull, F. G. S., is the only writer who has accounted for those changes in a satisfactory manner. This gentleman confines himself principally to the strata of England, in his illustrations; but it will be seen that they easily solve all the difficulties that Darwin alludes to respecting these changes in the American continents.

Mr. Saull's elucidations proceed regularly from a fundamental principle as a basis, that the granite is the most ancient stratum, for on this all the other beds are successively deposited; and he is confirmed in this opinion by observations made in different parts of the earth, which tend to prove that such is the case. For not only in both Americas, but specimens have recently been brought from Australia, which exactly resemble the granites found in Devonshire, in Scotland, &c.

Having established a basis, he then proceeds to chemical analysis, which proves that this rock is composed of quartz, mica, and felspar, in the latter of which only is contained a small quantity of calcareous matter, probably not more than two or three per cent.; but that this is the germ, as it were, of production, of the shell, the fibre, and, ultimately, the bone, flesh, and food, so necessary for the support of organized beings when they come to be developed on the surface of our planet.

He then arrives at this conclusion,—that, by the action of water and the atmosphere, this hard substance is pulverized and decomposed, and in that state—when the circumstances are favorable, viz., under a tropical climate, and also saline waters—corallines would germinate from the root or basis before-mentioned: these being reduced to powder by the action of the element in which they grew, would in their turn, reproduce more, and thus the fertilizing principle would continue progressing; and so it is found on analyzation of all the primary rocks, which exhibit a gradual increase of this necessary material in the ascending order.

Now, as this material is found to germinate spontaneously, as it were, in hot climates only, the author deduces some original conclusions, which are of great value and importance, with reference to the effects on our planet.

1st. That matter and motion are universal, and that nothing whatever can be completely passive or at rest.

2d. That the revolution of a planetary body on its axis, and in its orbit round the sun as a primary body, being universal also, definite effects are thereby produced.

3d. That these effects are, *à priori*, light diffused, which light being atomical, although immeasurably minute, the excitation of the atoms being greatest where the recipient body revolves most rapidly, or traverses the greater medium in space, namely, the equatorial parts; hence it follows, as a necessary consequence, that the greater heat will be diffused on its central or equatorial zones, gradually decreasing towards both poles, where the motion of course is slower.

4th. That all parts of the earth's surface partake of the genial influence (so to speak) in regular successive order, requiring immense periods of time to accomplish it; and that our planet is, therefore, constantly and universally progressing, with reference to beings existing on its surface.

5th. That the elevation and depression of the oceanic waters in both hemispheres are also regular and constant, and most probably the effect of motion, although it may be distinct and subject to other laws than the changes of climate before alluded to.

6th. From these facts the conclusion naturally

follows,—that our planet is regularly changing its position, *en masse*, with reference to the centre of the system, the sun; that is, although polar axes will always exist, yet that their position cannot be constant, but variable, producing those great changes of position, and consequentiy of temperature—requiring periods of time almost beyond our calculations, but which, by astronomical investigation, will no doubt ultimately be established.

These are the principles on which Mr. Saull establishes his theory, and which he satisfactorily proves by examining the various strata of the earth. Through all the primitive rocks, from the granite up to the clay state inclusive, no organic remains are found—hence their term *protozoic*, that is, before life; but the calcareous matter has gone on increasing, and in the next stage, in what was heretofore called grauwacke, but now the upper silurian, we find life first developed in a few varieties of shell-fish only; other beds intervene, almost destitute of organic remains, succeeded by strata of great thickness, containing corals in abundance, and exhibiting for the first time, their masses in the form and pattern as they grew, with trilobites, orthroceratites, leptera, cyathrocrinites, orphis, euomphalus, &c. Abundance of other fossils are found in these beds, indicative of a tropical climate and the preponderance of saline waters.

Above this appears the old red sandstone, in some places upwards of 3000 feet thick, in which are no corals and but few fishes and shells, which he considers to be proof that a cold northern climate then prevailed, and the structure of this great formation shows it to be marine.

Above the old red sandstone is the mountain limestone, in which the abundance of what was animated life strikes us with astonishment. We discern, for the first time, the nautilus, with much larger orthoceratites than before, accompanied with spirifera, producta, bellerophon, crinoidea, with an immense number of corals, of innumerable varieties of species, and of the greatest beauty, the clear indications of a very hot climate, and also the prevalence of the oceanic waters.

Next in the ascending order is the millstone grit, the greater part of which is destitute of organic remains. Now, although this formation appears to be oceanic, yet there are many stems of vegetables found in it, which most probably, by some of the violent perturbations of the surface by volcanic or igneous action, have been forced into it, seeing that these stems of plants are all filled up with sea sand. A limestone bed succeeds, in which we trace scales, jaws, and teeth of many species of reptile fish, with marine or fucoid plants, which is considered by the author as a convincing proof of the gradual increasing heat of the climate during this period, and as preparing for the next most important epoch, namely, that of the great coal formation. Here it is evident that the oceanic waters had receded from the northern hemisphere, and the surface was covered with magnificent plants, with palms, palmacites, shrubs and arborescent ferns, with reeds in places of thirty or forty feet in height!—and it appears the atmosphere was replete with moisture as well as the surface of the earth. Baron Humboldt considers that at this period our climate resembled the hottest part of South America, whence some of the tributaries of the greatest river of the Amazons flows, which he graphically describes thus: Fresh water streams running in every direction; vegetation in places absolutely impenetrable; the moist, humid atmosphere producing rapid decomposition of the vegetation, and on the other hand forcing it like a hot-bed, so that some shrubs grow more than twenty feet high in one year: hence we naturally account for the vast quantity of bituminous coal, which is clearly proved to be of vegetable origin.

After this period the saline waters appear to preponderate, since the stems of the plants, &c., are all filled up with sea sand; and the proofs appear complete, that the temperature was gradually growing colder, since, in the next beds, the fossils are less numerous, but they clearly indicate their marine origin.

In the ascending order he now arrives at the new red sand-stone, and this he finds almost a repetition of the old red so much below it. In its sandy and frequently finely lamellated structure there is abundant proof of oceanic action and deposition. There are but very few fossils imbedded in it, yet small fossil fish are numerous towards the upper part of this bed: parts of the stems of trees are occasionally found, but they are completely filled up with silica. Now, as these could not have grown in the ocean, they must have become imbedded in this mass by other circumstances, probably volcanic action. The great masses of rock salt in this country are also found in this formation, which is a complete proof of its marine origin, and most probably those depositions and incrustations took place during the gradual decrease of the oceanic waters.

The author assumes that the temperature now increased in warmth, since in the lias formation, which succeeds the new red sand-stone, the remains of crocodiles, icthyosaurus, and plesiosaurus, are found for the first time, with large nautilus; and ammonites of a great variety of species, with a vast abundance of fishes covered with scales, an infinite variety of shell fish, crustacea and testacea. Corals are also abundant in this bed.

Immediately above this, in the marlstone beds, he traces the impressions of plants, most of which resemble those of the southern tropics of the present day. Again, a change, and the oceanic waters preponderate. In the lower oolite the fossils are principally marine, and perhaps these lived under a colder clime; but the fossil remains are now so numerous and intermixed, that Mr. Saull cannot discover those broad and well-marked lines of distinction which he has so clearly pointed out heretofore.

The coral rag exhibits an amazing growth of corals, many of them of the species growing at the present day in tropical seas. In the upper oolite he finds evidences of a warm climate, with its corresponding fossils; the most remarkable of which are those resembling the zamia or cycadeoidea of the present forests of Africa, with large fossil trees. Again, we arrive at fresh water and mixed beds, in one of which, the Wealden, are found the remains of the iguanodon, so admirably described by Dr. Mantell. This amphibious reptile must have been, when at full growth, not less than eighty feet in length. Mr. Saull's museum is rich in the number of bones it contains of this most extraordinary being. There are vertebræ

resembling those of a fish, more than eight inches in diameter; portions of the femur larger than those of the elephant of the present day; one immense claw, weighing nearly three pounds; and several pelvis, and metatarsal, and metacarpal bones, with many others.

In the green-sand, and in the gault, he is of opinion that the climate was again cooler; but in the next beds, the chalk, the temperature unquestionably was hot; the fossils and even the strata itself, being entirely of marine origin.

At the period of the London clay, he supposes the waters gradually retiring. Then all the valleys were tidal lakes, as evidenced by the remains, which consist of crocodile, nautilus, turtles, crustacea, and testacea; and as the hills were uncovered vegetation succeeded, consisting of plants, the seeds and fruits of which are analogous to those growing in much warmer latitudes than ours at the present day, perhaps resembling that of southern Africa. Thence he infers that the evidence bears out or supports the conclusions at which he arrives, namely, that with the decrease of the level of the waters, the heat of the climate increased, until in the succeeding period, when the first of mammalia, or hot-blooded animals, appeared; these are the palæotherium, anoplotherium, chiropotherium, lophiodon, &c., mostly resembling the tapir of the present day. Again a change: the ocean returned. Marine beings innumerable are found at this epoch, with the bones of the walrus and the whale. This in regular sequence again changed. The waters receded, and we then recognize that interesting period when the huge mastodon, the noble elephant, the rhinoceros, hippopotamus, hyena, tiger, boar, bear, wolf, deer, and horse, were the inhabitants of our now northern clime.*

I have already illustrated in this paper the change from this epoch to the present, in attempting to unravel the history of the horse.

The remarkable change of character in the British strata has for a long period attracted great attention with geologists; but no one has brought forward such an interesting and satisfactory theory as Mr. Saull. He considers also that, in astronomy, he has both an explanation and a proof of his views, that in the northern and southern hemispheres there is an alternate increase and diminution of the waters of the earth in successive periods of 25,800 years, being those of the precession of the equinoxes, and arising from the same cause; and he has satisfactorily established the proof of the changes of situation in the pole of the earth by a number of places, which have changed their latitude and longitude within the last 200 years.

It would be foreign to the subject to enter into the astronomical calculations by which Mr. Saull so easily solves enigmas that have for a long time embarrassed the geological world; for it must be confessed that they account for, and are fully equal to explain, all the geological phenomena—all the formations, all the variety of strata, all the fossil remains, and all those circumstances which are inexplicable without it.

* Mr. Saull's interesting museum, supposed to contain the largest private collection of fossil remains in the kingdom, is liberally opened to the public every Thursday morning, at 11 o'clock: no introduction whatever is required.

The motions of the earth are still going on silently around us, like those that have passed; and the fair regions which we now inhabit must, in the regular course of nature, be covered again by the ocean. New layers of marine productions, of sand, gravel, and broken mountains, will overwhelm the soil to which we now feel such lively attachment; and, finally, new countries, or arrangements of land, will again rise in due course on those mundane sites which at present are occupied by civilized Europe, and by the northern parts of Asia and America.

For my own part, I see no moral evil to deplore in these changes. Nothing is effected abruptly, and man and animals are gradually warned to seek new habitations. The notices are slow, but unerring; and the human race will find fresh and renovated countries prepared for their subsistence and abundantly fitted for their enjoyment, by these grand operations.

I have already adduced sufficient evidence that the sea has covered the land at different periods; and any one who views the interior of our country must be sensible that its swelling hills and low valleys leading to the sea, must have been produced by the action of the oceanic waters. Volcanic agency from below has also produced many great and important changes in modifying and re-arranging the surface of the earth.

We will now endeavor to apply the knowledge we have obtained to investigate farther the ancient history of the horse.

Arabia has been frequently described by natural historians, from the very superior breed of horses found there from the earliest recorded times, to be the soil that gave birth to the primitive horse. I confess that at one period I entertained a similar opinion, and indulged my fancy-flight in imagining the first pair of horses located on some verdant plain in Arabia the Happy, and bearing a strong resemblance to the war horse described so emphatically in the Book of Job: "Hast thou given the horse strength? Hast thou clothed his neck with thunder? Canst thou make him afraid as a grasshopper. The glory of his nostrils is terrible. He paweth in the valley, and rejoiceth in his strength: he goeth forth to meet the armed men. He mocketh at fear, and is not affrighted; neither turneth he his back from the sword. The quiver rattleth against him, the glittering spear and the shield. He swalloweth the ground with fierceness and rage; neither believeth he that it is the sound of the trumpet. He sayeth among the trumpets, Ha, ha! and he smelleth the battle afar off, the thunder of the captains, and the shoutings."

This is a magnificent description of a war charger—but, splendid as it is, it will equally suit the horses harnessed to the war chariot of Queen Boadicea, which spread dismay and death in the breasts of the Roman legions, when Cæsar first invaded the shores of Britain. I do not by this remark mean to throw any doubt on the superiority of the Arabian breed of horses, but merely introduce it to show that Great Britain also possessed a very superior breed at this early period. We have already seen that they existed on our island long before man was created; and the probability is, that the breed which the ancient Briton then possessed were descendants of the olden race—modified greatly, of course, in conse-

quence of the change of climate which had gradually taken place during an immense period of time. Whether the peninsula of Arabia possessed horses, at the epoch to which our history refers, which we are certain that our country did, we have not the means of clearly ascertaining: the probability is that she did not. We find Arabia to be an elevated table land, sloping on the north gently towards the Syrian desert, and encircled along the sea coast with a belt of flat sandy ground. The soil of this flat country, from its regular inclination towards the sea, as well as from the large beds of salt and marine exuviæ with which it is interspersed, appears to have been at no great geological period a part of the bed of the ocean. This flat country produces the principal pasturage, and contains rich groves of dates and other fruits. The interior of the country is chiefly burning sandy deserts, lying under a sky almost perpetually without clouds, and stretching into immense and boundless plains, where the eye meets nothing but the uniform horizon of a wild and dreary waste.

It is observed that the sea, particularly on its western coast, still continues to recede. The reefs of madrepore and coral which abound in the Arabian Gulf, and in some parts rise several fathoms above the sea, are increasing and coming nearer the shore. Thus this flat fertile part of the country is constantly extending its limits. Muza is mentioned by Arrian as a seaport of Arabia Felix; we now find it at a distance of several miles from the sea. In the southern part of the Arabian Gulf the sea is also receding from the land.

From these facts we come to the conclusion, that at the period when horses were freely ranging throughout the continent of Europe, the present flat fertile land of Arabia, if not the whole peninsula, was covered with sea; and it appears altogether absurd to suppose that nature would have placed her first-born pair of horses on such a desolate and sandy soil, even if it were not so.

That Great Britain was once connected with France there can scarcely be a doubt. The nature of the cliffs, similarity of strata, and other circumstances, sufficiently prove this; and all tends to increase the opinion, that Great Britain has as good a right to be considered as the primæval birth place of this noble animal as any other country on the globe. It is true, that the present state of our knowledge is not such as to warrant us in coming to any certainty on the subject, but on the whole, I consider it to be very probable.

The earliest historical account of the horse comes from Arabia. The author of the Book of Job is supposed by Dr. Hales to have lived 184 years before the birth of Abraham. The scene of the poem is laid in the land of Uz, which Bishop Lowth has shown to be Idumea. The Arabs also themselves trace the genealogy of their Nedjyds up to the time of Abraham; and when we consider the almost religious zeal with which the preservation of their pedigrees has ever been regarded, and the rigorous enactments which have been resorted to in order to preserve the purity of their breed, we certainly must give them some credit for their statement.

The Nedjyd breed, so serviceable in the cause of Islam, is supposed by the Arabs to have obtained, through Mahomet, the prophet of God, an occult capacity to read or repeat, tacitly, every day some verses of the Koran. It was one of their old proverbs—that, after man, the most eminent creature is the horse—the best employment is that of rearing it—the most delightful posture is that of sitting on its back—the most meritorious of domestic actions is that of feeding it; and they were taught by the prophet to believe that it was originally predestined for their special service.

LETTER FROM THE REV. J. H. TURNER.

For the Farmers' Register.

I thank the editor for his permission to reply to Mr. Peyton's last communication, but must respectfully decline it, especially as that gentleman is not allowed a similar privilege. In fact, there is nothing to reply to; for, except a long list of insulting epithets and coarse figures, which I do not choose to copy, there is nothing but a *second* edition of his former piece, to which I have already fully replied. Now all epithets and figures of this sort are ranked by me with planting beans in a *liquid*, and then succeeding these with corn plants--they are entirely out of my line. I beg leave, therefore, to refer all such matters to Mr. Peyton and his worthy associates, Macaire Princep and De Candolle. Chaptal is again excluded from the other Frenchmen, because I happen to know that he can be of no service in this thing.* In the mean time, if Mr. Peyton should think proper to issue a *third* edition, and I find it *improved* as well as *enlarged*, I will then with pleasure claim the privilege of a reply.

One other matter deserves a little notice. My "mammy," who, according to one of Mr. Peyton's chaste and elegant sentences, planted "successive crops of cotton in her cotton patch behind the kitchen chimney," and thus *practically* taught me that the same crop could be profitably reared on the same ground for many years, taught me also another important lesson, which I remember to this day; and that is, that if I ever did an injury, whether intentional or not, to any human being, that not only justice, but my *honor* was concerned, in making a becoming reparation. This good lesson I now propose to reduce to practice. Judging from the sprightliness of Mr. Peyton's imagination and the brilliancy of his fancy, traits not often associated with the soberness and mellowness of age, I did venture to conjecture that he was a *young* man. The gentleman, however seems piqued at the charge, and refers to his quondam schoolmates to prove that he was in existence at the very remote period of *twenty-five years ago*. I am therefore guilty of this unintentional injury, and, as the only reparation now in my power, I do hereby promise, that if I ever have occasion to speak of the gentleman again, I will do it under the appropriate title of *old* Mr. Peyton.

J. H. TURNER.

* If Liebig should again undertake to "modify" the matter of the beans, I think it would be well for him to extend his modification to the figures and epithets also.

ON ORGANIC MINERAL MANURES.

By Prof. Charles Sprengel, (translated from the German.)

From the Gardeners' Chronicle.

Under the name of organic mineral manures are comprised those materials which (as the name implies) are composed partly of organic remains and partly of mineral substances; thereto belong mould, mud, artificially prepared compost, rubbish collected in the streets, the soil of sinks, &c. These organic mineral manures are of great importance in agriculture.

1. *Mould.*—Mould is that kind of soil which occurs often in low lands, is very rich in humus, and at times contains some remains of plants. If the situation is not too damp, and if the higher grounds which surround it are composed of clay, argillaceous, marly, or calcareous substances, it generally possesses such superior qualities that it can be immediately carried and spread as manure, inasmuch as, under the circumstances just mentioned, it consists of a mixture of earths impregnated with humic acid and other materials strongly promoting vegetation. If, however, this mould is accumulated in wet places, and the surrounding heights are composed of sand, it is, generally speaking, of such an anomalous composition that it will spoil any ground on which it may be carried, unless it undergoes some previous preparation, because in this case it contains much protoxide of iron impregnated with humic acid, and is, at the same time, very deficient in the earths combined with that acid, as well as in the saline substances which constitute a most essential nutriment of plants. The value of every sort of mould depends (as is the case with all substances used as manures) on its component parts. If it is, therefore, intended to form at once an accurate idea of the effect which this manure will produce, it is to be subjected to an accurate chemical analysis; especially the organic remains containing nitrogen, are to be inquired into, inasmuch as its value will entirely depend upon their quantity. The generally received opinion, however, is, that any sort of mould is only so far useful as it supplies the soil with a greater quantity of humus. I have already analysed several sorts of mould which were used as manures, and for the sake of proving what I have just stated, I subjoin the analysis of a mould which came from a valley surrounded by sand-hills, and which, in its application, did not produce any considerable result.

100,000 parts of it are composed of—

52,910	"	silica and quartz.
31,269	"	humic acid.
10,200	"	coal of humus and vegetable remains.
2,312	"	alumine, combined partly with humic acid, but mostly with silica.
1,554	"	protoxide and oxide of iron, combined with humic and phosphoric acid.
0,044	"	protoxide of manganese partly combined with humic acid.
0,632	"	lime, mostly combined with sulphuric acid, but partly mixed with the coal of humus.
0,146	"	magnesia, partly combined with silica or mixed with the coal of humus.
0,870	"	sulphuric acid, partly combined with calcareous earth, partly mixed with coal of humus and vegetable remains.
0,045	"	phosphoric acid, combined with oxide of iron.
0,008	"	common salt.
0,010	"	potassa, mostly combined with silica, and traces of substances composed of nitrogen.
100,000 parts.		

If an approximate calculation is made of the quantity of humic acid which is combined with the bases (alumine, manganese and iron,) it will be seen, that this mould contains at least 15,000 parts of free humic acid, acting as such. To this is to be added, that it contained neither humate of lime, humate of potass or soda, nor any substance containing nitrogen; and another reason why it could not yield a good manure is, that it contained a quantity of humic protoxide of iron. This mould was, therefore, of very little use; so much so, that an additional quantity of common manure was required.

All those kinds of mould which are ascertained to possess superior manuring qualities and which are found in low places surrounded by clayey or argillaceous hills, are, on the other hand, composed of the following substances:—33 per cent. humic acid, 6 per cent. coal of humus, 9 p. c. alumina, 3 1-2 p. c. lime, 1-2 p. c. magnesia, 2 1-2 p. c. oxide of iron, 1-2 p. c. oxide of manganese, 42 p. c. silica and quartz or sand, 1-2 p. c. gypsum 3-4 p. c. phosphate of lime, 1-4 p. c. potash, 1-10 p. c. common salt, and 1 1-2 p. c. organic remains containing nitrogen. From the quantity of bases here, it is clear that such kinds of mould cannot contain any free humic acid; they consequently act very differently from the last. At times, good kinds of mould contain only 12-13 p. c. of humic acid, and 45-50 p. c. of sand.

It would be superfluous for me to detail again in what manner the humic acid of the mould is beneficial to vegetation, as this has been repeatedly stated on former occasions. If it contain organic remains composed of nitrogen, they form by their decomposition nitric acid, which then, combined with the different bases, forms saltpetre, possessing powerful manuring qualities.

Mould improves, chemically, all sorts of soil, even that richest in humus not excepted, because it contains generally from 50-60 p. c. mineral substances, amongst which are, as we have just seen, some very efficient ones. The mould, or the humus contained in it, renders a clayey soil more light, whilst a sandy soil is made thereby more firm and kept in a damp state. It is, consequently, especially adapted for soils that burn, in which it is often more efficacious than even dung. If the soil is light and sandy, you will make use of a mould somewhat clayey; if, on the contrary, the soil is clayey, a rather sandy mould is to be employed.

The length of time during which the effects of the mould may continue, cannot be easily determined, as it depends on its quality and the quantity used. Large quantities improve the soil after even 20 and more years, whilst small quantities act but for a comparatively short time.

Before the mould is ploughed in, it is to be well pulverized, which will have the advantage of causing the seed of weeds which may be contained in it to germinate, and of inducing the protoxide of iron contained in every sort of mould sooner to change into the oxide. It is this protoxide which

produces the sharpness or acrimony which is so distinctly perceivable in some sorts of mould. It is also advantageous to scatter it in winter over growing rye, and then harrow it in early in the spring, and roll it. The latter operation is, however, not advisable with a mould which is very light and rich in humus; such mould is better applied when the rye is a few inches long, otherwise it may be carried away by the wind.

If it contains a considerable quantity of vegetable remains undecomposed, it is always advisable to collect it at first into smaller, and then into larger heaps, for the sake of drying it, allowing it to decompose in that way for a year or a year and a half; and this will be still better accomplished if it be mixed with lime, marl, ashes, or dung, or concocted into compost.

LAYING LANDS TO GRASS—THE NEW SYSTEM.

From the Massachusetts Ploughman.

Every farmer of experience has found it difficult to give every field a proper share of dressing from the barn-yard. One lot is ploughed, manured, and planted; a second lot is treated in the same manner; then a third, and so on. But as it has been customary to plant one lot two years in succession in order to rot the sod thoroughly, half a dozen years are required to prepare three lots for grass. Now before the lapse of this term the first lot may need ploughing again, though not one half of the good tillage lands of the farm have had a single visit from the manure cart. The consequence generally is that a large proportion of the tillage land lies unproductive, and the owner says it is not in his power to make farther improvement for want of manure.

Under that old system none of the plough land was turned over except that portion which bid fairest for a good crop of grain, and all those lots which lay low, or between highland and meadow, were suffered to lie unproductive, or to run to bushes and briers.

Now the new system which we have been practising for nine years past professes to relieve the farmer from this difficulty. Instead of planting and sowing so many acres as to exhaust all the manure of the farm, we have been urging the propriety of planting less and of keeping more acres in grass. And in favor of this plan we have been offering to farmers various weighty reasons.

It is known to all men of experience in these matters that hoed crops are very expensive, and that they are resorted to in most parts of New England for the purpose of fitting the land for a more profitable burthen—for grass. Very few calculate on being remunerated from the proceeds of the corn field or the potato field without taking into the account a whole series of crops, including not less than three or four cuts of grass to wind up the series. It is quite common to hear people say they expect no net income from their hoed crops, but that their hay harvests will repay all the outlays necessarily made in tilling.

It is quite clear then that if the hand tilling, or a part of it, can be dispensed with, no loss will ensue to the cultivator. On the other hand if he well considers the subject he will be convinced that "there is much gain, every way."

If he can renovate his old mowing grounds, or a portion of them, without going through with a tedious process of tilling, he not only saves labor but he spares his land, he avoids subjecting it to an exhausting crop, and he can thus give every field a dressing in due season, because each one will require but little manure.

It is quite a common practice to turn a green-sward field in the spring and plant it with corn or potatoes without applying any manure during the first season—a little ashes or plaster being put in the hill to set the corn growing—and tolerable harvests are often obtained under such culture, reliance being placed on the rotting green-sward to carry out the corn, &c., to maturity.

Now instead of letting corn or potatoes have the exclusive benefit of a rotting green-sward, we may rather let the next year's grass have it, for grass is more profitable than grain. Turn green-sward land one month after haying is over and you secure a rowen crop under the sod, more valuable as manure than the grass you turned under in May for corn; consequently but little manure will be needed in addition to this rowen to give the field a good dressing for grass.

It is agreed by all observers that there is no comparison between grass and grain as exhausters of the soil; that it is doubtful whether grass is an exhauster. If grass then is the principal burthen of the field there will be no kind of difficulty in making the field rich; and every one knows that in a great proportion of New England grass is more profitable than grain.

But is it feasible to keep land in grass without adopting a system of rotation embracing corn, grain, and potatoes? This is the point to be proved, and the remainder of this article will be devoted to it, premising that we do not recommend the entire abandonment of any article which the farmer may want for his own use.

Green-sward land may be renovated to better purpose by turning it in August and sowing grass seed on the furrow than by sowing the seed in the spring in company with spring grain. For proof of this we appeal to all who have tried it. We have within four years persuaded hundreds to adopt the practice of sowing grass seed on the green-sward furrow; and we have heard of but just two instances of failure where the rules which we pointed out were observed. These two were in Beverly, where the land was dry and sandy and the seed was thrown on in a very dry time.

It is true we have heard farmers say they had tried fall seeding and did not like it; on inquiry we found they had sowed as late as October—some with manure—some without manure—many had sowed in September, after corn or potatoes had been taken off—or in August, on stubble land turned over but not manured. The consequence was they did not well succeed—the winter killed the roots or the dry weather scorched root and branch.

On the other hand we have heard hundreds complain of the failure of spring seeding within the last two years. When sown with oats, particularly, if the oats did not so spring up as to choke the grass, when the oats were removed the sudden admission of the sun, on plains fairly exposed to the rays, has proved very destructive to the young plant.

It is not contended that all fields can with equal ease be turned so flat as to be fit for sowing without tilling. We speak of the thousands and thousands of acres, lying within forty miles of the capital, which may be so turned and sown. A good plough will turn any tolerably easy land flat enough to be sowed down; and it may be laid more even at this season than in the spring when the land is full of hard lumps.

But in this system we are not confined to the common tillage lands of the farm. We plough all our low grounds that will bear a team. We plough the strips lying between meadow and upland. We plough glades of land that have borne nothing but brakes and rushes, and low blueberry bushes. We plough lands that are not suitable for planting, on account of the springs that gush up in the early part of the year; and we lay these lands as even as a carrot bed. Lands that we could not meddle with in May, we can manage with perfect ease in August.

By turning the sod under and keeping it there, we render the soil more light, and it holds in grass two years longer than it will when it has been thoroughly rotted; and there can be no question but that the green crop of grass, &c., that we turn under will be very suitable manure for the grass that is to follow. Grass must be as good manure for grass as rye straw for a new crop of rye, or as corn stalks for a new growth of corn. But a light top dressing is required in all cases, to insure a good growth for the scythe next season, and to guard against the frost of the coming winter.

As a general rule, the best time for sowing grass seed is about the last week in August. If sown earlier than this, we are in more danger of summer killing—if later, we run more risk from winter frosts. It frequently answers well to sow rich land in the month of September, and we have known very good swaths to be cut in the summer, when the seed was sown the preceding October; but we cannot recommend this late sowing as a safe practice.

If grass is not an exhauster of the soil—and we cannot perceive that it is—how rich any tolerable farm may be made, when the principal product is grass! How light, also the labor of manuring a grass farm, compared with one that has numerous acres in tillage! Lastly, and above all, compare the profits of grass with the profits of corn, or of any kind of grain, in the district extending forty miles each way from the capital, and you will see the propriety of so filling our own markets with hay as to put a veto on all importations of the article from other states. We would rather buy grain than hay.

MAGNESIAN LIME.

Extract from the Farmers' Cabinet.

He says, many farmers in Delaware are very particular with respect to the purity of the lime they use: "One of them informed me, that some of the Schuylkill lime is so impregnated with magnesia, that it is not worth buying; and other kinds so pure, that you cannot buy too much of it." Then follows the stereotyped authority of Tenant and others, "that magnesian lime is exceedingly injurious to land." Now, if this knowledge or opinion of these farmers is the result of a rigorous chemical analysis, conducted by themselves—for it does not appear that any body else examined it—I must congratulate them on their advancement in chemical knowledge; such attainments were certainly very rare among such farmers as I mixed with some years ago; but that was in the *benighted* county of Chester, where it seems that the farmers long cherished an inveterate prejudice against all book-learning. But if they are mere opinions, formed without any knowledge of the true composition of the article they were using, what reliance can be placed on them as a foundation for, or proofs in support of a very important theory? It is against attempts to base a theory on mere opinions, assumed as facts, and from such a theory deducing very important practical consequences, that I have all along been contending; if in doing this I have used strong language, it was not for the purpose of irritating any one, but to arouse attention, and direct inquiry to the subject, and bring theory to the test of facts and practice, closely and vigorously investigated. We have had *namby-pamby* essays enough on the subject, leaning on the authority of great names, and meaning any thing or nothing, just as you please. My design was to state explicitly for what I was contending, that my views need not be misunderstood, and if erroneous they might be shown to be so; but in this I may have failed. I have stated it as a fact, that immense benefit has been derived from the use of lime in agriculture, in south-eastern Pennsylvania, and parts adjacent, and that the whole improvement in agriculture, so far as lime is concerned, is due to magnesian lime and to none other. I also stated it is a probable conjecture, though not an ascertained fact, that magnesian lime was better, or at least more economical for some purposes of the farmer, than pure lime.

The first of these propositions your correspondents admit, with a salvo, however, that the improvements might have been greater, if pure instead of magnesian lime had been used. Upon the second point then, the whole controversy turns: Is, or is not the great body of the limestone of south-eastern Pennsylvania of the magnesian variety? All the authorities within my reach, go to prove the affirmative of this proposition. Judge Cooper, many years ago analyzed several specimens from the great valley of Chester and Montgomery counties, collected between Coatesville and the Schuylkill; all or nearly all of which proved, if my memory serves me, highly magnesian. Several years afterwards, the late Dr. Joseph Coates of Downingtown, analyzed several specimens from that neighborhood, which all proved of the same character. The analyses of four specimens from the same district of country, contained in page 309 of vol. 4 of the Cabinet, show them all to contain magnesia; three of them, however, in but small proportions; those, however, it may be remarked, are from quarries which have not been largely used for agricultural purposes; while the other, containing 41 per cent. of magnesia, is from a quarry whence immense quantities have been taken for those purposes. Professor H. D. Rogers, the state geologist, in a letter which I received from him some time ago, states explicitly, that "a very large excess

of magnesian limestone, compared with the pure carbonate of lime, exists in the counties of Lancaster, Chester and Montgomery:" and then adds, "indeed, if I were to confine myself to the great valley of Montgomery and Chester counties, I might say that limestone, free from magnesia, is of rather rare occurrence; the quantity of magnesia, varying in different layers of rock, from 5 or 10 to 40 per cent. The proportion of magnesian limestone, in the secondary blue limestone of the Kittatiny valley, and the Pequea valley, &c., of Lancaster county, is not so great, yet it is difficult to find a quarry in which it does not abound." He further adds that many of the limestones long in use by the farmers of Europe, are as magnesian as our own.

Your correspondent, C. Taylor, thinks I use an expression two strong entirely, when I say, that whatever part of the improvement in south-eastern Pennsylvania is owing to lime, is owing to magnesian lime, and none other; but is it stronger than the above authorities will warrant in the absence of all evidence to the contrary? It was only of its general character I spoke. It cannot be expected that we should analyse every stone or layer of rock that has been used, but only enough to show that magnesia does generally and largely abound.

With respect to the effect produced by any particular lot of lime, we are always willing to take the opinion of intelligent farmers, because such things must always be a matter of judgment; but for the composition of the lime used, we are not to be satisfied with any thing short of a rigid analysis.

If those residing in or near the limestone districts above mentioned, and differing in opinion with me as respects their magnesian nature, wish to bring this controversy to a close, they may readily do so, and at the same time add to our stock of useful knowledge. Let them make a tour through the districts, visiting all the quarries from which lime has been obtained in any considerable quantities for agricultural purposes, and select specimens from each, particularly of those strata which produce a lime held in the best estimation, and let the specimens thus obtained be submitted to a careful analysis by some competent chemists. The results of such an investigation, when made public, ought to, and will, in the minds of all reasonable people, settle the principal point in dispute. S. LEWIS.

Pottsville, July 20th, 1842.

SEEDING ON GREEN-SWARD FURROWS.

Form the New England Farmer.

Mr. Butman.—In your paper of the 31st of August, there is an inquiry, in what part of the state the experiment has been made of seeding on green-sward furrows, and how the farmers liked the practice. We are disposed to give "Essex" information concerning our experience and practice, without participating at all in the dispute whether this be old or new husbandry.

Some twenty or twenty-five years since, the writer was told that Mr. Z. Estis, of Hanover, practised ploughing sward-bound fields, manuring and seeding with grass, without any intervening crop. The first suggestion of such a course was sufficient inducement to make an experiment, as much fruitless labor and expense had been given in attempts to raise grain crops on cold and clayey soils. Every experiment made has been attended with very satisfactory results. There is no loss of crop in the course, and yet most of the purposes of naked fallow are fully accomplished. The gradual dissolving of the sod prevents the soil from falling into too compact a state, (a common evil on low lands,) and imparts nourishment for many years to the new grass. We have a field which was ploughed and seeded in August, 1825: it has not been very frequently or copiously dressed with manure, and is still in better condition than mowing fields generally. Another field, seeded twelve years ago, and dressed once in two years, produced this year a very large first crop and a second is now ready for mowing. This practice is worthy of all commendation on land not suited to grain crops. Where Indian corn would be likely to grow well, we should think it a more economical and better course to plough in the spring, apply manure, plant with corn, cultivate with a level surface, and sow grass seed at the last hoeing.

"Essex" seems disposed to blame farmers for neglect in communicating to the public, if the system concerning which he inquires has been pursued "for a long course of years." Remissness in communication is no doubt an easily besetting sin, and the writer will not deny that it sometimes lies at his door; but on this subject there is no consciousness of any improper reserve on his part;—all suitable occasions have been embraced to direct the attention of farmers to a practice so intimately connected with their interest and prosperity. All practicable publicity has been given to views entertained on the subject. In an account of the cultivation of the writer's farm, which was published in the N. E. Farmer, vol. x., page 360. this practice was mentioned as part of the system pursued. In the county of Plymouth, the practice has not been extended proportionate to its utility; but we have the satisfaction of seeing a good number of farmers every year adopting it, and where one experiment has been fairly made on a farm, an intelligent owner will be very certain to repeat it. M. ALLEN.

Pembroke, Sept. 2d., 1842.

This communication induced us to turn to the back volume where Mr Allen detailed his modes of farming, and we found a part of his account so full of instruction that may be valuable to many of our readers, that we make no apology for re-publishing it.—ED. N. E. F.

To the trustees of the Mass. Agricultural Society:—Situated at a distance from any considerable market town, it would be absurd in me to think of entering into competition in the aggregate amount of crops, with farmers in the vicinity of the city, where manure is attainable to any desired extent. On the supposition, that the management of farms is judged in reference to local advantages and inconveniences, my hope is founded of sustaining a claim to a premium. There have never been any very great improvements made on my farm in any one year. The object has been yearly to add something more in earthy and vegetable substances to the fields, than was

taken from them in the removal of crops. To give a just idea of improvements made, a brief history of the operations may be necessary.

My first purchase of land was in 1802—fifteen acres; the greater part of which was in a very rough state, and, as much of it had been tilled, reduced by severe cropping. The rocks were removed to enclose the lots, and the bushes subdued with the plough, as fast as necessary means could be obtained for accomplishing those objects; the progress was not rapid in the beginning, because, being entirely destitute of capital, I was obliged, in seaman's phrase, to 'work my passage.'

"When the fields were enclosed with walls and the bushes subdued, attention was directed to the plats which had been tilled almost to exhaustion. And the principal means of renewing them within my power was the incorporation of earths of different qualities. Cold and tenacious soils were dressed with silicious earth and other materials that tended to open and warm them. Sandy soils were dressed with clay, swamp mud, and alluvions in which sand formed the least considerable part. This course, in seven years, gave ten tons of English hay where less than two were obtained before, and about double the quantity of grain on the acre.

"In 1817, another lot of sixteen acres, a large portion of it in a similar state with the first, was purchased and managed in the same way. About the same time were purchased seven acres of fresh meadow; on which no other improvements have been made than clearing away bushes, tunnelling and cutting ditches in such directions as would irrigate the whole meadow. Another small lot was enclosed from a pasture in 1820, and has since been cultivated as English meadow and tillage. Four acres of the above lots are light sandy soils; six acres hazel loam, suitable for grain or grass; five acres dark friable soil; fifteen acres argillaceous; and ten acres of irrigated fresh meadow. Seven acres were planted with Indian corn the present year—three acres of loam and four acres of sandy soil. On one acre of the loam about six cords of barn manure were spread and ploughed in; on another acre, where in other years meadow mud had been applied, six casks of lime were spread; on the other fields, which produced rye the preceding year, there was no application. The corn was planted in drills: this method has been in practice on the farm more than twenty years, and is in my judgment preferable to any other. The corn was harvested between 20th Septemper and 20th October. Weight of the whole crop, 22,381 pounds—298 31-75 bushels. The same field the preceding year, produced 120 bushels of rye. The present year there were only about two acres in rye, and the produce was 25 bushels.

"There are nine acres in tillage, alternately planted with corn and rye, excepting once in five or six years each field is planted with potatoes, beans, or some other vegetable considered favorable as a change from the ordinary course. The stubble of rye is ploughed in, immediately after the removal of the crop, and some kind of seed applied to produce herbage to be ploughed in as green dressing. Potatoes this year were planted only on the borders of corn-fields, under trees, and in other situations where not much produce could be expected—eighty bushels were gathered. From two hundred to three hundred has been the average crop in the last four years. No other roots are cultivated except in the kitchen garden. Thirty-two acres are mowed, twenty of which have been ploughed and will produce good English hay in common seasons, with liberal manuring; but a succession of wet seasons has introduced on a part of it so much wild grass, that the hay is not now suitable for the market, though good stock hay. There are ten acres of irrigated land, as above mentioned, and two acres of fresh meadow over which the water does not often pass. The hay was located before the offered premium was published, in such manner that it is impossible for me to ascertain with accuracy the quantity. Some of it was placed in barns with old hay, and some of it sold in the fields. The crop of hay has varied very little for four years, yet supposed to have gradually increased. In 1827, the whole crop was measured in the mow in September, after it was thoroughly settled. Four cords of English hay were considered equal to a ton, and five cords of fresh. According to that measurement, there were thirty-three and three quarter tons of first quality, or good English hay; ten tons of second quality; and fourteen and two-fifths tons fresh hay. Five acres then mowed are now in tillage. From two to three tons of second crop are annually cut, in situations where it is not convenient for cattle to feed.

"Compost manure, made with reference to the quality of the soil where it is to be applied, is every year spread on the mowing land. Sand is made a principal ingredient of compost for clayey soils, and swamp mud or clayey for loose soils. From three to five hundred loads, forty bushels in the load, are made in a year and applied chiefly in autumn, not so much for choice as necessity, there being no other season of sufficient leisure to accomplish the work. In laying down tilled land to grass, I choose to sow the seed about the last week in August and put no grain with it; but any time in the month of Septemper will do better than either of the spring months; and if sown with winter rye, it will do better than with spring grain. The clayey soils which are not suitable for grain, I sometimes turn over with the plough immediately after the grass is cut, roll down the furrows, and put on a dressing of manure and seed again. In this course cultivated grass is renewed without the loss of any crop. I used chiefly herds-grass seed, and put one-fourth of a bushel on an acre.

"I have forty acres of pastures of a light soil, and in the possession of other owners, it was alternately tilled and pastured in so quick succession, that only very small crops of corn or rye can now be obtained. The number of acres discouraged me from attempting to renew it in my usual way of mixing soils; and therefore a plan is formed to renew it in the operations of nature. Last spring, a field of between two and three acres was fenced, ploughed, and sowed with the seed of the yellow locust tree. The seed came up well, and the most thrifty of the young trees are now three and a half feet high. If the worms should not oppose me, there will probably be a very flourishing grove, which in a few years will effectually recruit the soil. In this connection, it may not be amiss to mention, that I have this fall sowed five acres of common land with the seed of white pine, and am now planting several acres with acorns, which it is intended to protect against cattle with a fence."

FALSE PRETENCE OF THE BANKS OF HAVING RESUMED PAYMENT.

The 15th of this month was the day when, according to the previous promise and annunciation of the ridiculous convention of bank presidents, the banks of this state were simultaneously and fully to resume payment, 45 days in advance of the time when the law will compel that measure. And accordingly, on that day, as the banks and their newspapers declare, they *did* resume payment. Moreover, it is a matter of boast in the newspapers, (according to usage and established precedent,) that very few demands for specie have been made on them, (and almost none of any consideration,) which fact is assumed as evidence of the still abiding confidence of the community in these self-degraded institutions. We dissent entirely from these inferences and assumptions; and, further, declare that there has been no real or *bona fide* resumption of payments; and that the present action of the several banks of Virginia, which is claimed to be resumption of payment, is but a new or rather continued part and parcel of the general system of falsehood and moral fraud which characterize the whole legalized banking system and policy, and consequent banking operations, of the state of Virginia.

The legal *branch feature* of the banks, alone, without any designed action on the part of the banks to use it for fraudulent ends, would of itself protect them from paying specie better than any specific obstruction imposed by law would serve for independent banks, having no branches. But this protection becomes incalculably greater, when the facility offered is used, as it has been by the several banks of Virginia, to send the notes of each branch as far as possible from the place where alone they are payable. The dishonest course has been regularly and for a long time pursued, of issuing at each bank and branch as few as possible (indeed almost none) of its own notes, but issuing, instead, the notes of other branches, as remote as possible. Thus the branch bank of Virginia at Petersburg, regularly issued notes for $1 and $2 (which the law required to be paid in specie, but which requisition was thus easily and effectually evaded, as the law makers, i. e. the bank presidents, designed it should be,) of the Buchanan branch; and we presume that the Buchanan branch issued those of the Petersburg or Norfolk branches. Wytheville is the place of payment for most of the Farmers' Bank small notes issued and circulated here. The same general course has been pursued by all, and the banks had this means perfectly in their power as to their general issues, because during the long past time of their suspension of payment, there was no reason or inducement for any individual to prefer a Petersburg or a Richmond note to one of Wytheville or Charlestown, when neither was payable in specie; and neither was there any mode left by the law and the courts, to compel a bank to pay in even its own notes, instead of those of a distant branch.

The effect of this long continued procedure is, that the circulation of each town in Virginia, and its surrounding country, is filled entirely with bank notes of distant banks and branches, (or of foreign bank notes, serving the banks' purposes even better,) and scarcely any notes are to be met with of the banks or branches close at hand. We infer this from the state of things in the town in which we reside. It is here very rare to see a bank note payable at either of the three branch banks located here.

What renders this procedure of the banks still more conducive to its dishonest end, is that in or for Virginia there is no one centre of trade. If the ultimate market of all the state was either Richmond, Norfolk, or even New York directly, the bank notes, no matter how scattered at first, would soon reach places where they are payable. But unfortunately for the general interests of this state, its trade is divided between its Atlantic towns, and Baltimore and the Ohio and Mississippi markets. And there is less trading intercourse between each two of the three great producing regions, than there is between Richmond and Liverpool. This condition and separation of trade and of markets multiplies the facilities of the banks for keeping their notes away from the only places at which their payment can be effectually claimed.

Having thus well prepared to meet all possible contingencies, the banks have delcared what they call a resumption of payments. And how have they resumed? They still refuse to pay specie, or even their own notes, for checks, whether drawn upon general deposites or for debts collected. And all that they will pay is their own notes, when any such by chance stray homeward from the distant places in which only they were issued for circulation. And, thus, even if every holder of a note, or other obligation really payable in specie at home, were to *dare* to demand specie for it, there would be no possibility of any early and considerable demand being made on any of the banks. But, nevertheless, their day of reckoning is not far distant. There is now existing and

operating an object to induce their distant notes to be sent homeward, and in a few months they will be at hand and in very inconvenient quantity. And after November 1st, the banks can no longer avail of the present false pretences of paying, and yet effectually withhold payment.

Eighteen months ago, we endeavored to expose the like exercise by the banks of the same false pretences; and we shall copy the statement then made, as being as applicable now as then, (March 1841,) when the banks pretended, for a very short time, and falsely pretended, in like manner, to pay specie, before they again boldly refused it altogether.

"It is one of the common arguments of the day, which we may hear any where in the streets, and which are as current as the banks' "*promise to pay*," that "the bank has received on deposite all sorts of notes —not only of all the branches in Virginia, but of the banks of North Carolina—and that it would be monstrous, and most unreasonable and unjust, to demand specie for checks drawn for deposites so constituted." Now, in the first place, the rule thus set up for the bank, if good, should work both ways. If North Carolina notes, for example, are to be paid out to checks, because such notes had been deposited, (*by the bank's own rule*, adopted for the bank's own benefit,) either by the drawer, or by others, in ordinary business, then it certainly would follow, that a depositor of specie, or of notes issued by the bank, should rightfully draw specie, or these only specie-bringing notes for his checks. Yet it is well known that such would *not* be permitted, unless as a matter of favor to the drawer, and a departure from the rule of the bank's *right*. All checks, for money previously and generally deposited, stand (and of right ought to stand) on equal footing; all deposites which the bank chooses to receive as its own notes, are thereby made the same (as to that bank) as its own notes; and the bank is in every sense bound to pay for them in its own legal and proper currency. If the consequences were likely to be inconvenient or injurious, and *if the practice had not been adopted for the special benefit of the receiving bank*, it would be very easy for it to refuse to receive deposites in any notes except such as it agreed to redeem in specie; or, if receiving them, to return them for payment to the banks whence they issued. But this returning of foreign notes, and receiving their own, is precisely what the banks wish especially to avoid.

But, in fact, (though it is not required to sustain our position,) it is just as convenient and easy for a bank to pay specie for deposites made in one kind of *paper* as another. Whether a deposite be made in the notes of the bank receiving the deposite, or of North Carolina notes, it would not add a dollar to the bank's stock of specie; nor would the payment diminish that stock more in the one case than the other. If then it be true, (as is alleged in defence of the banks,) that it would be "impossible for them to pay specie for deposites made in foreign notes," it is equally true that it would be just as impossible to pay them if every deposited note had been of their own issue. We are very willing to admit the impossibility in both the cases.

As it presents a curious incident in the history of the progress of irresponsible banking in this country, we will copy the notices of this bank, (signed by the cashier,) under which it claims exemption from paying checks, and seeks to avoid all such demands. They are now stuck up at the counter of the Branch Bank of Virginia; and under these, or some equally potent safeguards, the like exemption from paying checks is maintained by all other banks in Virginia.

"*Notice.*

"All deposites made in this office are to be considered as made in current bank notes.

"Oct. 16, 1839."

"*In addition* to the above notice, depositors are further notified, that in order to avoid any difficulty at the counter, they are required to make their checks payable in CURRENT BANK NOTES.

"Feb. 11, 1841."

Thus, if this be indeed a "specie-paying bank," (and if this is not, then there is certainly not one in Virginia,) it is guarded at all points against paying specie to any extent either injurious to the bank or beneficial to its creditors, or to the public interest.

First, all of its own notes (by some means, whether designed or accidental, natural or supernatural, it is not our business to establish) have been taken out of the home circulation, and substituted by others issued by remote banks; and, therefore, readily as its own notes may be redeemed by the bank, there are almost none that can be presented for redemption.

Secondly, all deposites are rendered irredeemable in specie, by virtue of the above notices; or in any other currency than the worst paper money which the bank may choose at any future time to receive.

Thirdly, even if the bank authorities opposed no such obstacles as are above stated to the making payments in specie, the fear of their enmity, and the tremendous influence which they wield over the trading community, would deter nearly every individual from claiming his just rights.

And fourthly, lest all these safeguards should prove too weak, the aid of new legislative enactments will be called in, and of which the purport and force are yet to be seen; but which will certainly fail of their designed object, if they do not secure the banks still more effectually than now, against all possible demands to pay their debts and comply with their obligations.

The three banks in Richmond, like the one spoken of here, pay bills of their own issue only; and still more strictly pay no checks, and have paid none, (as a general rule,) since their pretended resumption. It is only a matter of inference that all the other banks and branches in Virginia do no better, and therefore are *not* now, nor have they ever been, even for a day, truly specie-paying banks. And if any doubt now exists, we think it will be speedily removed by their admission of the fact of general re-suspension. That will probably be the acknowledged state of things before this article can be issued from the

press. The North Carolina banks, which occupied precisely the like grounds, (of pretended resumption of payments, and real continued suspension,) have already, since the foregoing remarks were written, thrown aside the thin disguise, for the purpose of saving the brokers the trouble of collecting their notes to obtain specie, and themselves from the odium of refusing to pay while professing to be "specie-paying" banks. The Virginia banks will all follow the same course as soon as it shall be deemed less profitable to them to keep up the present deception, than to publish the truth of a general refusal to pay all demands. If the lapse of another week does not bring them to this result, two months certainly will."—*Farmers' Register for March*, 1841.

The predictions made in the latter part of the foregoing extract, were all fully and speedily verified.

While the banks are thus guarded at all points (except from the demands of foreign and other brokers, who can arrest their notes in their distant circulation,) from paying any considerable amount of specie, it is as ridiculous as it is deceptious for their mouth-pieces to talk about the small amount of demands made on them for payment. Let the banks lay aside these defences, (which would stigmatize and disgrace any individual, as a shameless and fraudulent bankrupt,) and resume payment *bona fide*, and then they may with something like truth claim whatever may appear of the forbearance of the community to demand payment. As it is, it would be nearer the truth to say that they are *required to pay every existing* and *valid obligation*; for of the very few notes of $5 or more in home circulation, scarcely one passes through the hands of three individuals, before it goes to the bank to be redeemed. If the few $1 and $2 notes remain somewhat longer in home circulation, it is because they singly present too small an object to the holder to seek payment. If all the notes of the banks and their branches were in home circulation, they would be presented for payment so rapidly, that the next avowed suspension of payment would probably recommence almost as quickly as happened in Virginia in February 1841, and lately in regard to the banks of New Orleans. Whenever the banks of Virginia shall *avow* suspension again, they will continue suspended to the rapidly approaching end of their long continued fraudulent course and present legal existence. And after November 1st, nothing will prevent the early commencement of that state of things, except new legislation to protect bank frauds, or, otherwise, that actual degree of confidence of the people in the banks, which is now claimed for these institutions, as operating, but which they take especial care to guard against being tested.

REMARKABLE EXTENT OF THE SECOND BLOSSOMING OF TREES.

To the Editor of the Farmers' Register.

Sandy Point, Sept. 20th, 1842.

Amongst the many ravages committed by the severe storm of wind and rain which passed over this section of country on the 24th of August last, was the nearly entire stripping of the leaves from that side of the fruit and other trees exposed to its unusual violence. On those trees, so prematurely and roughly denuded of their covering of leaves, nature is now making a vigorous effort to restore those appendages, even at this late season, which I think is well worthy of record. The unusual, beautiful, and interesting anomaly is now presenting itself, of apple and other fruit trees in full and perfect blossom. Instances of this nature, I am aware, occur (to a very limited extent) almost every season, particularly on plum trees, but never have I seen so general a flowering. Some apple trees here are as amply and completely covered with blossoms as generally happens to them in their natural flowering season. Where apples have not been entirely shaken off the trees by the violence of the storm, a dish of fruit can be gathered from one side of the tree, and a bouquet of flowers from the other. Pomona and Flora are here as intimately hand in hand as they are on many of the plants of the citron family. The apple is not the only tree which presents this interestingly beautiful phenomenon; the plum, cherry, pear and walnut exhibit the same; and on one side of a double flowering cherry, (exposed to the storm,) there is a good display of the beautiful blossom natural to that tree.* A few blossoms of apricots are also appearing. A plant of Persian lilac is in full bloom, and the buds of many other flowering shrubs show an evident tendency to speedy developement, if not shortly arrested by early frosts. I have thought the interesting character of these unusual but natural effects, the efforts of nature to replace a beautiful portion of her works, so unseasonably destroyed, well worthy of notice. Some sages, from these appearances, prognosticate that the now approaching winter will be a severe one; others, that some fearful and direful calamity is about to pass over the country.

A. Nicol.

SOWED CORN.

From the New England Farmer.

It may amuse, and perhaps be of some advantage to the agriculturists of the country, to be correctly informed to what extent of production the soil may be relied upon or referred to. This is especially important to those who have but little

* Many of the petals of these show a tinge of red not natural to them, fit emblem of the hectic on many a young and fair cheek destined like them to premature decay.

land to cultivate. My attention having been drawn, in past time, to this subject, I this year (1842) appropriated a piece of ground for the purpose of sowing in broadcast (so called) a quantity of Indian corn. Relying on the prevalent saccharine matter, thought to be therein contained, I took what is commonly called sweet corn. It came up well, though its growth was not comparable with that planted in the hill. At the first appearance of the spindle [tassel] a portion of the lot of average appearance was cut, and two careful persons were my assistants in weighing the product (August 22.)

The production was as follows: 272 1-2 square feet or one rod, gave at the rate of 13 tons 1225 pounds to the acre. It may be well here to observe, that after spindling, at several subsequent periods, there was a decrease of weight.

My next experiment was made with Southern flat corn. This was scattered in rows. The growth was rapid, favored by the season. This too was taken as the spindle began to appear, and the production was calculated in like manner as in the preceding case, and was a little over 21 tons to the acre (Sept. 2d.)

In both cases these crops were fed out in aid of the pasture.

The result in both these experiments would seem to give great force to the system of soiling, well thought of and recommended by so many agriculturists. JOHN WELLES.

Natick, Sept. 6, 1842.

NEW JERSEY MARL BEDS.

From the Farmers' Cabinet.

We have rarely passed a day more pleasantly, in any little excursion, than we did the 2d and 3d insts., in company with our highly valued friend, Edmund Ruffin, editor of the "Farmers' Register." He was desirous of viewing some of the *marl beds* of New Jersey, and we made a flying visit to a few of them in Gloucester county, about five miles south-east of Woodbury. There has already been a good deal said and written upon these remarkable deposites; as well as upon the almost incredible effects that have resulted from their application to the soil; but much more information is requisite, before their value will be thoroughy appreciated, or their character distinctly understood, especially by those who have not seen them. It is not our intention to make even the attempt to throw any new light upon this exceedingly interesting subject; but merely to name the places we visited—a few of the results mentioned as having grown out of the use of marl, and to draw if possible the further notice of others, to these abundant sources of wealth, to our native state.

It is well known the marl region of New Jersey stretches through the interior of the state, from Monmouth, across the entire breadth of Burlington and Gloucester counties, and penetrates, also, the upper parts of Salem. The beds lie at various distances from the surface, and of course offer every difference of facility in excavating them, and are overlaid by a great variety of material. Our friends, Benjamin Whitall and William R. Tatum, accompanied us in our ride, and from their familiarity with every location in their neighborhood, were enabled to make many interesting statements, with respect to the change which the use of marl has made in the face of the country. We visited the marl bed of James Davis, which lies a mile and a half east of Woodbury, and two or three miles to the west of the western limits of the district which includes the green-sand marl. It lies in the bottom of a valley, covering a few acres, and is overlaid with bog iron ore, of so much richness, as to have been purchased some fifteen or twenty years ago, by a person of the name of Richards, and transported, principally by water, to his iron works on Egg-harbour river. This marl appears to be intermixed with sand and clay, as well as some ferruginous matter, and is apparently destitute of any calcareous substance. The owner has used it recently to great advantage; and William R. Tatum showed on some of his own higher ground, a lightish sandy loam, evidences of great beneficial results from its application to grass. We next called upon our friend, John L. Cooper, of Good Intent, near Blackwoodtown, who showed two beds at different elevations, in the hill on the north-west margin of his millpond. This is a hard, reddish colored substance, with a good many decomposed shells, and smelling considerably of sulphur. It was used to some extent and to some advantage, thirty years ago, but is now neglected. A mile further on, a little beyond Blackwoodtown, and on the same stream,—the head of Timber creek,—is David E. Marshall's genuine green-sand marl; apparently the *pure* substance. This lies in the hill, on either side of the stream, is ten or fifteen feet in thickness, and is overlaid by four, five, or six, or eight feet of sand and gravel, and also by a hard material of a few inches thickness, resembling iron stone. This marl is much used, and to great purpose. It is hauled ten or twelve miles, and with the other marls of the neighborhood, is generally spread as a top dressing upon grass, in the spring, at the rate of ten to fifteen tons per acre. On inquiring at the pit, of a person who was digging and hauling it away, whether the owner, D. E. Marshall, had himself used the material to much extent, and to great advantage; he replied in the affirmative, with a look of astonishment that such questions should be asked, and an earnestness of manner, that was a strong pledge of his sincerity. In looking for proofs of its usefulness on D. E. Marshall's farm, he said we could hardly go amiss. We, however, did not walk over the farm—we had not time to do so; but the fact, that its fertility had been vastly increased, by the application of this marl, was familiar to three of us. We next passed on to the extensive excavations of Josiah Heritage, on the head waters of Mantua creek, and two or three miles south-west of D. E. Marshall's. This also is green sand, or as it is also often called, gun-powder marl, of the first quality. It is carted ten or a dozen miles, and applied with an effect that is really astonishing. Among the green-sand, which is from ten to twenty feet in thickness, no organic remains are to be discovered. It lies on either side of the creek. The present operations are on the north side. It is covered with sand and gravel to the depth of six or eight, or ten feet, as well as by a marl of a reddish brown appearance, that is of considerable value, though far inferior to the green-sand marl. In some

places, a solid layer of what were once shells, fifteen or twenty inches in thickness, separates the sand and clay, &c., from the upper, and less valuable stratum of marl* just mentioned. And the green-sand itself, lying along a little ravine that juts up from the main stream, is overlaid by a dark brown limestone, ten or twelve inches in thickness. This stone is intermixed a good deal with shells, and a kiln has been built on the adjacent hill side, for burning it. We had not the satisfaction of seeing J. Heritage himself, and could not of course, ascertain exactly the quantity annually taken from these pits. Our friends however, who are familiar with the operations there, drawing away, themselves, more or less every season, believed that six or seven thousand tons must have been removed last winter. It is sold by the rod, or by the ton, say 10 to 15 dollars the square rod, and the purchaser digging it himself, or 37½ cents a ton, the owner uncovering it, and making it of easy access to the team.

The green-sand marl of this neighborhood, and it is of that only we speak, is best adapted to what are often called *natural* meadows—to lowish moist, but drained lands—to cold, sour quicksandy soils, where the springs are near the surface, and the virgin soil was naturally poor. These are the soils that the gunpowder marl of this vicinity best suits. We do not say it does not benefit some other soils; but from all we learned and from our own experience, it does little or no good, when spread on grass, on a light, sandy soil; and especially if the sandy soil reposes upon a sandy subsoil. All the different marls of the neighborhood, however, appear to be decidedly beneficial to a potato crop, and that too, on every variety of soil at all suitable for potatoes.

On the road from D. E. Marshall's to J. Heritage's, we passed through the farm of Thomas Chew. It contains 160 or 175 acres of cleared land. Eight years since, it was poor, and exceedingly unproductive, scarcely affording pasture and hay for eight or ten cattle and horses. Some six years since, the owner, observing what was passing around him, and concluding that Heritage's marl was adapted to his land, entered with considerable and praiseworthy spirit into the work, and has marled nearly all his farm. We were assured that, during the summer just passed, more than 100 tons of hay were cut on this same plantation, and that the summer stock is at least quadrupled.

On Joseph Whitall's farm, one mile south-east of Woodbury, is a bed of dark bluish clay, intermixed with shells, which he has used to considerable advantage on his higher and lighter grounds, where the green-sand marl is of little or no use. A much heavier dressing, however, is necessary with this material, than with the green-sand, on the lower grounds. This farm, with those of W. R. Tatum, Joseph D. Pedrick, James Davis, D. E. Marshall, Thomas Chew and J. Heritage, were named to us, as having been vastly improved by the application of marl. On many others in the neighborhood, similar improvement is perhaps not less obvious. The above are named, because we passed through, and saw them ourselves, in our little ride. One more fact, and we are done. All the beds of good green-sand marl, that we have any knowledge of, in the counties of Burlington, Gloucester and Salem, lie on the head of our creeks, above the reach of the tide, and west of the ridge which separates the streams of the Atlantic from those which flow into the Delaware.

It was said above, that nothing new was to be looked for, in these cursory remarks. They have been confined to what came under our own eye. Speculation has been avoided. We do not undertake to say, of what these extraordinary deposites are composed; how, or whence they have been gathered, or in what their fertilizing quality consists; and for this very plain reason, we do not know any better than our readers. We anticipate, and we partly promise to the public, an article from our friend of the Farmers' Register, worthy of himself, and creditable to this broad subject. We shall impatiently await its appearance.

* All earths are called *marl*, in this neighborhood, that are found useful for agricultural purposes, when applied to the soil.

THE SANDY SOILS OF DELAWARE, AND THEIR FORMATION.

From Booth's Geological Survey of Delaware.

To the traveller who for the first time passes through Sussex county, the formations would undoubtedly appear to consist almost wholly of loose white and yellow sands, but a more thorough investigation shows the fallacy of such a conclusion, proves that in reference to geological deposites, the argillaceous greatly predominates over the sandy, forming the substratum of the whole county, but that the latter overlying and capping the clays over a large proportion of the surface, communicates the well-known sandy character to the soil. These upper sands probably cover one-half or two-thirds of the county, are of very variable thickness, sometimes yellowish and more tenacious, at others nearly white, and so loose, as to be readily transported by the winds. We have had occasion to notice them casually, while describing the lower clays, from Milford through the eastern and south-western portions of the county. Along the eastern border they are generally of inconsiderable thickness, from six inches to several feet, and the lower clays may often be thrown up by the plough. Towards the S. E., the sand is unusually white, and may probably be found of sufficient purity for the manufacture of glass. If this formation be examined in the vicinity of the coast, its very undulating surface must strike the observer. A surface we would suppose to be more level from its position, we there find to consist of a series of hillocks apparently following no law relative to form, size, or situation, consisting wholly of light sand sometimes bare, but generally covered with herbage. The sand is so slightly coherent, that often where the sod has been removed in an exposed situation, the action of the wind roots it out to the depth of several feet, distributing it over the surrounding soil or heaping it against a bush, fence or other obstruction. The formation of *dunes* along the coast at Cape Henlopen is due to the same cause. As the fine sand thrown up by the waves of the ocean becomes dried, it is raised by the wind, and deposited on the sides of the present dunes, which were first

formed by its lodging on the outer edge of a pine-forest. They stretch along the shore for some distance, enclosing one of the light-houses, and imburying many of the trees, some of which were about 40 feet in height, and yet their tops only appear on the dunes like small bushes. These dunes are evidently of very recent origin, and still in the act of forming, as is proved by the moderate age of the trees, and the want of herbage on their surface. The whole forest against which they have lodged appears, from the very undulating surface of the ground, to have sprung out of the remains of more ancient dunes. Similar appearances are observable near the coast in Baltimore hundred, and may be traced for several miles inland, until the undulating surface gradually becomes more even, and forms the ordinary superficial stratum of light sand.

That the superficial stratum of sand is due to the destruction of sand dunes is more clearly seen in the western portion of the county, where the arenaceous stratum is much heavier, often attaining the thickness of 20–30 feet, and many of the ridges of loose sand are nothing more than dunes which have resisted the destroying influence of the wind, and may be traced from the lower hundreds to the sources of the Nanticoke in the southern part of Kent county. Indeed, in whatever direction we approach the Nanticoke, from its source to the point of its crossing the state line, a range of sand hills strike the observer from their frequency—often from their continuity, their steepness, and the lightness of the sand composing them, circumstances which would at once induce him to refer them to the same origin as dunes. The sand is of so loose a nature, that where the sod is removed, it is very liable to removal by the wind, to the great annoyance of agriculturists. While alluding to the forest lands of the upper counties, we have incidentally noticed the existence of sand hills, which increasing in number and extent as we approach Sussex, and gradually passing into the sand dunes, must be attributed to the same origin. But although we meet with the sand in great abundance in the form of detached and connected hills, the greater portion of it constitutes a nearly level covering to the subjacent clays, varying in thickness from 1 to 20 feet, and covering a large amount of surface in the south-western part of the county. In N. W. Fork hundred, the greater part of it is in the form of hills, and there is a comparatively small amount on the dividing ridge, where the soil is usually more or less argillaceous. This formation of light sand should not be confounded with several ranges of gravel hills in the county, which have a totally distinct character, although they are partially covered with the sand. The most striking of these ranges is one lying to the south of Milton, and between Georgetown and Lewes. It is a ridge of variable breadth, not more than 50 feet in height, extending for several miles apparently in a N. W. and S. E. direction, composed of fine gravel and sand with a sufficient admixture of clay to render it compact. Its isolated situation in a region composed of such different materials has attracted the notice of the inhabitants, and given rise to a variety of conjectures relative to its origin. It is undoubtedly to be referred to the same causes, formerly in action when the land was beneath the water, which are now operating in the bay to form shoals and bars, and which, if the whole bottom of the bay were elevated, would present the similar elevations composed of sand and gravel.

Reviewing what has been said relative to the sand in the two preceding sections, we find that it is a stratum covering one half or two thirds of the county of Sussex, and extending partly into Kent, composed of a light-colored sand of a fine and even grain, containing scarcely a trace of argillaceous matter, excepting on its surface, and so loosely deposited as to be liable to shifting from the action of the wind, that the greater part is distributed as a loose covering over the surface, from 1 to 30 feet, but probably averaging 5 feet in thickness;—that it is frequently drifted into the form of hills, closely resembling the sand dunes still forming on the coast near Cape Henlopen, and may be refered to the same origin.

IMPROVEMENT OF SANDY SOILS.

From the American Agriculturist.

In a short jaunt we have recently taken through that paradise of New England, the Connecticut valley, we have witnessed a success in the reclaiming of worn out sandy lands, which we hardly dared to expect with the ease, economy and facility with which it has been accomplished. The Hon. W. Clark of Northampton, has been the great pioneeer in this course, and from the successful results he has achieved we may fairly class him among the great agricultural reformers of the present day. He has already given to the public the theory of his operations, which we hope to find room to lay before our readers at some future time. Our object now is simply to give his *practice*, and after our farmers have begun the good work of reclaiming their almost barren wastes, it will be a pleasure for them to look into the modus operandi, and see the reason of their success. There are three essential features in this practice, and the simultaneous adoption of each is essential to effect the desired object. The first is the frequent and thorough use of the *roller;* the second a constant covering of crops on the ground; the third is the introduction of clover and grass as a fertilizer. To illustrate this, we give the history of a single field of some 40 acres of worn out sandy soil, in the vicinity of N. This field was purchased by Mr. C. some eight or ten years since for nine dollars per acre, while the fertile bottom lands on the other side of the town, would sell readily for $150 to $200. His object was first to get a crop of corn if possible, and the land being too poor for this, he carried on to it a moderate quantity of peat or swamp muck, which was found in the low places on the same field. We may observe, in passing, this peat and muck exists to an almost unlimited extent throughout New England, and we consider it of vastly more intrinsic value to the community that all the gold mines that have dazzled the eyes of our southern neighbors for the last fifteen years. With this dressing, say of fifteen to thirty loads to the acre, the whole cost of which consists in simply digging and throwing into heaps to be drained, and acted on by the atmosphere, after which it is carried either by carts or sleds in winter on to the adjacent ground; the

land is then ploughed, and whatever scurf, sand, grass, rushes, mosses, pusseys and briers there may be on the land are turned under, and such is the *digestibility** of the soil all these raw material are at once converted into humus or geine as food for the required plants. This sandy soil has the stomach of an ostrich, and if it cannot, as that voracious biped has the credit of doing, digest old shoes, iron spikes, and junk bottles, it can dissolve and convert into vegetable chyle, whatever organized matter is given to it. The effect of this comparatively slight dressing yielded a first crop of some thirty bushels of corn to the acre, enough to pay for the first cost of the land and the whole expense of producing it. But while the corn was growing, say from the 20th July to the 10th August, rye with red and white clover seed was sown, and the corn being so planted as to admit of harrowing two ways, or even four if necessary, it was well got in with the harrow, and the ground being amply protected by the corn during the sultry weather of this season, the new seed took a vigorous start, and as soon as the corn was somewhat matured, it was cut and carried off the ground, and the new growth then had the entire possession. The roller was then thoroughly applied, as also in the following spring. The early sowing gives strength to the roots of both rye and clover, and renders hazard of winter killing either, especially the clover, much less. When from any cause he is prevented from sowing the clover early, it is omitted till early in the following spring; a postponement that should be avoided when possible, as it thus loses a year's time, requiring another season to mature. The rye is cut the following summer, when the clover is suffered to remain, shedding its seed upon the ground for a successive crop. The following season, if in proper condition, it is again put into corn or rye according to its fertility, and the course is again renewed. The land however usually requires an additional season in clover, and sometimes more, to give the requisite fertility. Mr. C. showed us a field, which from the originally poor condition described, without the addition of any manure or peat or muck, has produced him five crops in seven years, the last, which had been just taken off, yielding seventeen bushels to the acre. This it will be readily admitted is a large crop for poor land, and much beyond the average yield in New England. The growth of the clover on this field, of this spring's sowing, was promising in the highest degree, and as evenly set as in the best land, giving every promise of a large crop the next season, which of course is designed to be added to the soil for its future improvement. When the land is first put into use, (for Mr. C. has several other similar fields which have been variously treated, though always on the same principles,) and it is too poor to produce a paying crop of corn, and he has not time to add the muck, he turns under the surface vegetation, and puts on a crop of rye, *always* accompanying this with the clover, and after one year's crop from this last, he never fails in a fair yield of corn. On a field thus treated, without any dressing of muck he got 27 bushels of corn per acre for the first crop, and after an interval of another season, obtained thirty-three bushels on the same land, showing a decided increase in the productiveness of the soil. A slight dressing of plaster is generally, though not always used, and never exceeds half a bushel to the acre. Mr. C. admits that more plaster might be useful; we think one to two bushels per acre would be applied with decided advantage, but it is purchased at a high price, about $10 per ton, and as economy and a self sustaining policy, has been a prominent principle in this system, this is all that has thus far been afforded. The muck would in all cases be a valuable remunerating addition, but this he has not always the time to give, and at the prices he has paid for his land, he can afford to leave it once in two or three years in clover, by which it is renovated, and for the present perhaps this may be the most judicious plan. As lands become dearer, however, which they are rapidly doing under this management, they being now worth $20 to $30 per acre, of no better quality than such as he bought a few years since at $8 to $12, the policy of manuring will become more expedient, though the rapidly improving nature of this system will give greater efficacy to the clover crop as a fertilizer.

It is surprising to see the elevated knolls and barren plains, that so lately exhibited nothing but a crawling sand, by the operations of the clover roots, in this otherwise impracticable material, gradually changing its inadhesive character to a firmly connected mass, showing a furrow slice that would gratify the most practised eye. Mr. Clark acknowledges his surprise at the facility with which the clover takes, and attributes it mainly to the use of the roller. We are inclined to concede much to that instrument, but think for his white and other clover he is greatly indebted to the plaster. Of this we have more to say hereafter.

We observed the wood-chucks, who are arrant epicures and gourmands in their selection of esculents, and especially of sweet and abundant clover fields, are thoroughly colonized over all the fields of Mr. C. They follow him, as our politicians do the successful candidate of executive dispensations, for John Randolph's seven principles, the five loaves and two fishes. They snuff his green patches of trefoils, and instanter abandon the poverty stricken fields of his unthrifty neighbors. His crop of wood-chucks, though not as important as the *shoe crop* at Lynn, may soon be well worth the harvesting.

Mr. C. has not pursued this cultivation sufficiently long to have matured a *system* of rotation, which, however, he virtually practises with some variations from his own judgment. A little more experience will enable him to determine, whether a crop can be taken more advantageously every second or every third year, but we are satisfied, with a moderate dressing for the corn, the rotation might be of three years' duration, affording alternately corn, rye, and clover, the last to be added entire *when dry* to the soil, for its improvement. Green crops are never used as improvers, they always being allowed to mature before turning under. Plaster should always be added, unless ashes or lime can be more economially applied; but the former is limited in supply, and the latter is to be had only at a price which will effectually prevent its use in this region.

Here, then, we have a *system* for reclaiming

* Digesting power.—Ed. Gaz.

barren wastes within every one's reach; costing nothing and yielding a great deal; and if this were rigidly carried into practice, how soon should we see the naked sand banks that exist to a greater or less extent, every where between the Alleghanies and the Atlantic, converted into verdant, luxuriant fields. Yet for the want of application and steady perseverance in this plain, straight forward, simple course, how many will continue to live on in ignorant poverty, when they might, with less toil, and the use of a moderate share of intelligence, have a competency. A single bar left down in this practice, lets in the whole herd of Pharaoh's lean kine. Without the roller and plaster you get no clover; if you cut off the clover when grown, you get no subsequent crop; or if you crop too closely or rapidly, the clover-bearing properties of the soil are exhausted, and new manures, or years of idle, wasteful fallow are necessary to resuscitate it; whereas, by a careful observance of the above plan, the ground is constantly and profitably at work, bearing its burthens on equitable shares, giving one half or two thirds to you, and reserving the remainder to itself, to enable it to continue the supply. Though Mr. C. does not connect any grazing or stock-feeding with these operations, it is easy to see how it can most advantageously and profitably be associated with them. Cattle and sheep can be put on to the rye fields both in fall and spring, when sufficiently thick and stout to justify it, and when well sodded over with clover, what more mutually advantageous to cattle and land, than such a copartnership?

NOTICE OF THE APPOMATTOX COAL PITS.

For the Farmers' Register.

The following notes were collected during a short visit to that part of the coal field on the Appomattox river. Approaching the coal field from the river the land is undulating, the soil varying in color and texture as the underlying rock, granite or hornblende slate appears at the surface. The disintegration of the hornblende producing a red tenacious clay—whilst the soil derived from granite is gray and light. The hornblende slate which dips to the east can be traced to the verge or out-crop of the coal measures, which dip in the opposite direction. Commencing at Rowlett's pits, one mile from the river, the general direction of the strike or out-crop is about north 20° east. In this line, and 5 miles north of Rowlett's, are Coate's old pits, now the property of Mr. Hall of Petersburg. These are the two extreme points at which coal has been discovered on the Appomattox, and even at these the seam was found too thin and too much disturbed to admit of successful operations—the coal at Coate's old pits being but 2 feet thick. Hill's old pits are situated one mile south of Coate's; the seam here, which is about 5 feet thick, was worked 5 or 6 years and abandoned. These pits were opened about 20 years since, and it is but within the last 3 years that coal has been discovered at any intermediate point. To a person at all acquainted with the science of geology this must seem strange. The dip of any stratum being given, the strike or line of direction of the stratum is also known, being always at right angles with the dip. The pits were worked at or near the out-crop; the dip was of course known and the direction of the out-crop could be easily traced. The thickness of the seam at Hill's indicating too an increasing thickness towards the south.

At Clover Hill the coal approaches within a few feet of the surface, being covered by a thin diluvial stratum. The discovery of coal at this point in 1839 was followed up by Mr. Cox with energy and intelligence. The Clover Hill pits were sold one year after their discovery, by Mr. Cox, and are now the property of the Clover Hill Company. They are situated 2 miles south of Coate's pits and about 4 miles from the river.

At first the seam was worked immediately at the out-crop; this has been abandoned, and a shaft sunk to the depth of 240 feet, being the deepest on the Appomattox, and about 336 feet west of the out-crop. The dip of the coal at the out-crop is 45°, the difference between the distance from the out-crop and the depth of the shaft, the surface being nearly level, shows that the seam flattens off towards the centre of the field. The dip in the shaft is about 20°. For a section of the shaft, with an illustrative suite of specimens, much valuable information, and other civilities, I am indebted to Mr. Cox. The shaft passes through the usual coal measures, consisting of alternations of sandstones, slate, grit, coal, shale, &c. The organic remains found are few and imperfect, with the exception of some gigantic calamites, measuring 10 inches in diameter, and generally found in a vertical position, their lower extremities resting on glance coal. The substance of these calamites is often different from the rock in which they are imbedded, proving that they were first enclosed, and subsequently replaced by matter from above. The coal here is 14 feet thick, including 3 feet of slate; it is worked in two parallel drifts, connected at intervals. By means of the divisions in the shaft the ventilation is quite effective. The floor of the drifts, having a slight inclination towards the shaft, the loaded corves descend by their own gravitation, and when empty are drawn to each extremity by a mule. We were struck with the favorable appearance of every thing here. The drifts are well drained, the roof excellent, not indicating the slightest disturbance. It is impossible to contemplate, without feelings of pleasure, this vast store for the future comfort of our fellow beings. The coal measures here, as on James river, rest on a coarse porphyritic granite. The seam worked however is not immediately in contact with the granite; several feet of sandstone and perhaps another seam of coal being interposed.

Twenty-five men are employed, and it is thought that the coal raised during the present year will amount to 150,000 bushels. The raising of the coals as well as the draining of the pits is effected by means of a small steam engine. The raising of water by means of rope and bucket is a great waste of time and power, and has nothing whatever to recommend it, excepting its extreme simplicity.

Johnson and Moody's pit is located 100 yards from Cox's line, the seam being the same as that worked in the Clover Hill pit. The coal is similar in quality, but the shaft being sunk nearer the outcrop, the depth is only one hundred feet. 15 men are employed, and about 75,000 bushels is the amount of coal estimated for the current year.

In the drift towards the south in this pit the coal is completely cut off by an east and west dike. A number of these dikes are seen crossing the river, and at Battersea, near Petersburg, a remarkable one occurs, composed of globular basalt and wacke. These dikes can frequently be traced on the surface. This is the case with the dike in Johnson and Moody's pits; so that much useless labor and expense may be spared by a careful examination of the surface, at the out-crop, previous to the location of a shaft. It is probable that the greatest thickness of the stratum of coal will be found a little to the south of this pit.

The Appomattox Company, we were informed, have commenced a re-examination of the land near Rowlett's abandoned pits. It is to be hoped that the proprietors keep accurate surveys of the workings; the result of every exploration should also be carefully recorded, and deposited together with the survey for safe keeping, as valuable information for the benefit of posterity. For want of such precautions, in the early mining operations of England, subsequent enterprise has suffered extensive and frequently ruinous losses. It has often happened, that after the cost of sinking shafts, draining, &c., had been incurred, the parties concerned have had the mortification to find that the coal had already been worked and exhausted, a fact of which the surface presented no evidence.

The quantity of coal, if any left in, should also be noted; for although a seam of 2 feet may not at present pay the cost of working, yet the time may not be far distant when even this thickness would be considered valuable. Many of the mines worked in the coal districts of England do not exceed 2 feet in thickness. Of the increasing value of this deposite no doubt can be entertained. At present the small coal which amounts to one-fourth of the quantity raised, is allowed to accumulate at the pits, the cost of transportation being too great to admit of its removal. In countries where fuel is scarce, small coal is used extensively by those who cannot afford better. It is mixed with earthy and other matter, made into a paste, which is rolled into balls, and in this way makes a tolerably good fire. This small coal when converted into coke is a good substitute for anthracite or charcoal. The bulk of the coal is much increased by the operation of coking, and could be furnished at a much cheaper rate. The process of coking is neither difficult nor expensive—a large brick oven being all the apparatus required. The oven should be about 8 feet square, having an opening in the top, and one in front, furnished with an iron door through which the coal is introduced. The coal once ignited, combustion is allowed to proceed slowly, until all the bituminous matter is consumed. The coke is then broken, withdrawn from the oven by means of strong iron rakes, and extinguished. The heap of small coal at one of the yards at the basin, would furnish convenient material for such an experiment.

From the pits to the Appomattox, a distance of 5 miles, the coal is hauled in wagons over a road far from level. It is then brought down the river 20 miles to Petersburg, in boats carrying about 200 bushels. The cost of transportation amounting to 8½ cents a bushel. In Petersburg the coal is delivered to purchasers at the yard at 20 cents a bushel.

With a view to lessen the cost of transportation a survey for a rail-road along Winterpock creek, was made some time ago. Besides shortening the distance, this road would cut off one of the worst points in the navigation of the river, between Petersburg and the coal pit landing.

The road should not be an expensive one, as little grading would be required. This improvement will be made when the value of the Appomattox coal deposite is properly appreciated by this portion of Virginia. A small amount appropriated to the improvement of the Appomattox would be of incalculable benefit to the coal and other trade of the river. The boats suited to the navigation of the river in its present state require 3 men for the space of 2 days to bring down 200 bushels of coal. Shute navigation being the cheapest mode of improving a river, answers very well when time and labor are of little value, but where competition of any sort is to be met, it must be abandoned. Dams and locks—still water navigation—can alone satisfy the demands of commerce, on any river claiming the name of navigable, at the present day.

With these improvements, and a connexion between the basin, the river and the rail-roads, the Appomattox coal would no longer be confined to home consumption.

We returned from this excursion with a higher estimate than we had already formed of the many advantages enjoyed by the town of Petersburg: an inexhaustible deposite of coal, almost on the very banks of a navigable stream; building materials in abundance and of the very best quality; water power to any extent; the means of increasing the fertilty of the soil a hundred fold, presented in the rich deposites of marl by which Petersburg is almost literally surrounded; a navigable river to her very doors, and rail-roads in every direction, ready to distribute the products of the industry and enterprise of her citizens.

M. TUOMEY.

MARSHY SOILS.

From Booth's Geological Survey of Delaware.

The richness of the marsh lands in the western and southern parts of Kent and on the ridge in Sussex has been a theme of admiration to all who have visited them. They are situated on the branches of the several streams, which having their sources in Delaware usually flow towards the Chesapeake, and which originating from rains and springs in the midst of extensive forests on a broad and very flat surface, with an argillaceous substratum impervious to water, and becoming clogged and dammed up by fallen trees, leaves and brushwood, naturally expand into broad basins, termed marshes. The luxuriant growth of trees, shrubs, and smaller plants, and their constant dilapidation and decay, in the shallow waters of the sluggish streams during the lapse of ages has generated a black vegetable mould, averaging three feet in depth, being rarely less than six inches and sometimes exceeding six feet, composed throughout of the same materials. It was not until the close of the past or within the present century that effectual means were resorted to for recovering this land from almost constant inundation, since which time nearly all the

great marshes have been drained by the excavation of ditches or more properly canals in the natural bed of the stream, and a large amount of the most fertile soil in the state brought under cultivation. One of these great drains increases from 12 to 24 feet in width from its source to its mouth, a distance of nine miles, and throws off a sufficient quantity of water in spring freshets to float a moderately sized vessel. The Colberth, Cow, Herrington and Tappehanna marshes in the west of Kent county are the main feeders of the Choptank, and Marshy Hope in the south forms a main source of the North-west Fork river. The principal and several minor branches of the Nanticoke have been also subjected to drainage, beside many smaller streams in Sussex. When all the water-courses shall have been confined in a similar manner within their proper channels, a very large amount of an inexhaustibly fertile soil will be brought under the plough, and the noxious exhalations of marshy lands will cease to produce diseases to which their inundated state renders them subject.

When we examine the soil thus wrested from the waters, an unusual uniformity of composition appears to prevail in it; it is black, very unctuous to the touch in its moistened state, rarely so light and spongy as not to admit of grain after a little cultivation, becoming sufficiently compact on drying and consisting of decayed organic matter and argillaceous earth. The organic matter chiefly humus-coal, and humin, a little of the humic and crenic acids, and that it does not contain uncombined acids, such as the malic, acetic or phosphoric in quantity, is shown by its productiveness immediately after clearing. The fertility of these soils is shown from the fact that some fields have been tilled in corn for 40 years in succession, without an apparent diminution of their productiveness; but nevertheless the idea, which seems to have become deeply rooted in the minds of the people of our western states, that such land can never be exhausted, cannot be too soon refuted and exploded in Delaware. No soil, however rich, can withstand excessive tillage, except it receive an adequate return of its richness; an assertion to which the experience of ages will bear witness, and which will be confirmed by the experience of the west, ere 50 years shall have elapsed. The quantity of organic matter in some of the marshes is so great that during a dry season, the soil which was accidentally fired, continued to burn like coal, and could only be extinguished by rain. The remains of such fires have been observed in several instances, where the carbonaceous matter having been burned out, left the earthy constituents converted into a substance resembling brick by the heat of the fire. It is said that lime applied to this land has sometimes been found injurious. It may admit of a doubt whether the experiments were judiciously made, but supposing that to be the case, it must arise from the existence of too much humin, or the organic acids, which the addition of lime would bring into a too rapid action. The proper course to pursue with it would be to give a very light dressing of lime, which has been exposed to air for some time in order to its combination with carbonic acid, in which state it guarantees a gradual decomposition of insoluble vegetable matter, as shown. There is one important use which these soils may receive and it is only surprising that so little attention has been paid to it; the adjoining lands, sometimes argillaceous, are usually light sands, and if a portion of the black marsh soil were spread upon them, it would render them both more productive and cohesive, and surely there is in nearly every place where it occurs a superfluity which should not be suffered to lie unproductive.

Similarly formed to the marshy soils and arising in part from them, are those black deposites in the creeks and branches, existing in all parts of the state, but abounding in Sussex and Kent. They are largely composed of organic matter, but contain more earthy constituents than the preceding, and appear to be better elaborated, and prepared for use. In a majority of cases they may be directly applied to land without mixture, and will prove a very valuable substitute for manure of the organic kind, but if extracted where the tide flows, it will often be requisite to expose them to frost, or mingle them with lime, or submit them to both, prior to their employment. It is not merely in larger streams we are to look for this material, but in small branches, brooks and even in the courses of springs; it may be found on nearly every tract of land in the state, and more especially to the south. It is a source of fertility within the grasp, and certainly within the means of every citizen, and it only needs to be tried, fairly tried to gain it a lasting reputation as natural organic manure. Experiments have been made with it to a very limited extent, and although successful, it is surprising that its use has not extended; for in some instances, applied alone it has doubled a crop of corn in the first season, and exhibited good effects for many years; with lime it has produced similar results which will stand the test of a longer time. This vegetable soil is not always uniform in its composition, for although in creeks it is usually black, and earthy, yet in some small upland ponds or swamps it is brown, light and spongy. In the latter case in particular it should be employed in connection with lime in the caustic state, i. e. freshly slacked, to promote incipient decomposition, and to correct acidity, and even in all instances of its application, lime will benefit it and insure greater durability of action. Many farmers in Delaware, really desirous of improvement, know not where or how to commence, since they cannot raise one-fourth the quantity of manure requisite for restoring productiveness, and their farms are extensive. Here is a material, with which to make the first attempt; let them use it alone, and if it prove good, continue until means are obtained to employ lime in addition to it; if the result be not favorable alone, let it be carried to the barn-yard, to form a layer of it there, and when its surface has been covered by manure, let them bring in another layer, and in such a manner, the quantity of manure may be increased many fold, without deteriorating its quality.

From the upper part of the state to its southern boundary the Delaware river and bay, and the sea-coast are skirted by flat lands of varying breadth sometimes exceeding a mile, subject at times to inundation, consisting of a flat, and dark colored vegetable mould, clothed with a luxuriant growth of reeds and grasses. Supposing them to average a mile and a half in width through the whole length of the state, we would have abou

100,000 acres of Delaware marshes, a large extent of land, which if it were brought under cultivation, would prove to be the richest land in the state. Its depth and richness of soil, and the ready means of restoring it when exhausted, are ample proofs of the assertion, but it may be reasonably doubted whether so great an undertaking as reclaiming this land at the present time would meet with an adequate return, when we consider its expense, the comparative paucity of population, and the imperfect system of agriculture pursued in the state. The successful execution of a small portion of the task in the upper county is ample evidence that the work is practicable, and the experience, which Holland has attained on this subject during ages, could be wielded in Delaware. But since it is not at all likely to be brought into execution for a long period of time, why may we not derive some benefit from these lands at the present time? Independently of the embankment of small tracts along the shore, and without reference to the grazing of cattle on these natural grass lands, the soil of the marshes may, and should be applied extensively as a manure on the upland. The embankment of ditches where they are not otherwise required, may be employed; or the marsh may be dug expressly with the view of employing the soil as a fertiliser, and it is such a vegetable mould which is chiefly required in Delaware to render it more fertile. The marshy deposite to which allusion was made, is variously composed, or more properly speaking, it is in different states of decomposition; being sometimes a black, unctuous matter, both vegetable and mineral, containing no traces of vegetable fibre, again a similar soil with fibre, and lastly a formation consisting chiefly of fibre or the undecayed roots and leaves of plants. The first of these is the most valuable, and may sometimes be directly applied to land without admixture, but it is advisable to adopt a uniform method of using it, which may be done in two ways, by mingling it with lime, better after exposure to the air for some time, or by drawing it into the barn-yard to bring it into an incipient fermentation by contact with stable manure. In either case it will more than repay its expense, and if lime be employed on the land at the same time a more powerful and durable influence will be derived from it. There is one kind of material bearing some connection with the preceding, a species of sea-weed, observed along the shore of the bay, but more remarkably constituted on the beach a few miles below Lewes, which will prove of great excellence, when brought to an incipient fermentation, as it contains much blue mud, and is penetrated, and inhabited by numberless shell-fish. It would become more useful if drawn into the barn-yard, and suffered to ferment in a slight degree, for the decomposing animal matter will bring the weed rapidly into a similar state.

There remains yet one other substance, which is easily obtained, and will repay the expense of its application to the soil. It is the "blue mud," which is constantly depositing from the river and bay, on the marsh lands under the circumstances pointed out in the paragraph referred to. The fertility of those lands of which it forms the upper surface, and its beneficial effects in the few instances in which it has been employed on the upland are a warrant of its fertilising powers, but it is a matter of some doubt to what substances its effects are mainly to be attributed. Its basis is a fat clay, both lead-colored and yellowish, with a quantity of organic matter, which appears to be chiefly in the state of crenic and apocrenic acids combined with the oxide of iron. There is no doubt that it would be advantageous if applied directly to the soil, but its tenacity is an objection to such a mode of using it, and hence it is more advisable either to draw it into the barn-yard, where it will be broken down and mingled with manure, or to mix it with lime, and expose it for some time to the air, adding at the same time the black marsh soil, which is generally to be obtained in its vicinity.

In the present section our attention has been devoted to a fertilising ingredient of a high order, which we have denominated "*Marshy Soil*," in order to embrace the several varieties under one head; in agricultural works it might be termed a *peaty* soil, but the term would not include all those which have been described, for the "blue mud" is wholly unlike a peaty soil, but being deposited on the river-marshes, it soon becomes a marshy soil, and many of the creek and western marsh deposites are far from being peaty, although they contain much organic matter. From a careful perusal of the section, it will be observed that this source of fertility is every where abundant, and in the two lower counties may be said to lie within the grasp of every farmer: let it not, therefore, as is too often the case, be disregarded or undervalued, for its abundance and convenience, but applied judiciously, frequently, and profusely. Its value rests not on a mere theoretic assertion, but it has received the test and sanction of experience, and such experience, both in Delaware and elsewhere, as may not be contradicted. As it would be a matter of nicety to discriminate between such varieties as are not sufficiently decomposed, and require some preparation prior to their application, and those which might be directly employed; it would be better to adopt a general rule relative to the mode of using it, viz., either to draw it into the barn-yard, or to form a compost with lime, or with ashes. In either case it will form an excellent manure, and with lime or ashes a durable one. It is indeed a fortunate circumstance that this valuable material is diffused in such abundance over the state, and not less gratifying that it is more widely distributed in Sussex and Kent counties, where the soil chiefly requires the addition of organic matter to restore it to its former fertility or even to excel it, and where it is of such a peculiarly light character as to require the use of precisely such a substance to render it more compact and tenacious, and more capable of repaying the expenditure of time, labor and materials, liberally bestowed upon it by the hand of industry and enterprise.

BONES.

It is said that in 1839, there were upwards of 30,000 tons of *bones* imported from foreign countries into Hull; and that in 1837, the value of the article imported into England, was nearly a million and a quarter of dollars. We remember to have seen a notice some months ago, of an exportation of bones from our own port, to Liver-

pool. Now is it possible that the enterprise and good judgment of our farmers will allow John Bull to carry our bones 3000 miles to spread upon his lands, and they themselves stand by, as if they thought them hardly worth the grinding! We are apprehensive that *bone dust* is not sufficiently appreciated in this vicinity, or the material would not be sent from our very elbows, to enrich the broad pastures of England.—*Farmers' Cabinet.*

ON THE CULTIVATION OF ARTIFICIAL GRASSES.

For the Farmers' Register.

Red clover.—On the proper culture of this grass, the very foundation of improved husbandry depends. To prepare the land suitably to sow this grass seed on, it must be frequently tilled, until the soil is in a fine mellow state, and the native grasses destroyed. The usual and best way on rich land is to sow the seed on wheat or rye in the month of March, in the latitude of Baltimore, the ground being previously cultivated in corn, then oats or barley, and then well manured for the wheat crop; then sow 6 to 8 quarts of clover seed to the acre. Something less seed may do when evenly sowed by an experienced, careful hand; but it is best to have seed enough sowed to completely cover the land, otherwise weeds come up in place of clover, exhausting instead of improving the land. But where manure is scarce, and the land rather poor, plough early in the season, and sow buckwheat, peas, corn or oats, to protect the land from the sun's rays, and smother weeds and grass, until a suitable time to plough these grasses in for the wheat crop; or if the ground is in order in time, say the 12th of July, sow buckwheat for a crop, and sow the clover seed at the same time. On sandy land clover frequently stands best if sowed the latter part of summer, and often does well with buckwheat, provided it is not sown two thick, or does not lodge. Also, where a corn crop is well cultivated, the ground in many cases may be got into such good order that the clover may be sown the last time it is cultivated, which may be done in August. And seeing clover is the great improver of land, and by it the land can be improved cheaper than in any other way, it ought to be exhausted as little as possible, in order that the clover may take, which if once well set, and suffered to remain on the ground without mowing or pasturing, and the second season's crop ploughed in, will often double or treble the wheat crop sowed on it, which is the cheapest plan of improving land, and of course the most important to every farmer, when improving a poor farm.

On rich land clover is apt to lodge; in this case it ought to be mowed for hay, to prevent its root from rotting. Most people handle clover hay too much, and expose it to dew and rain until all or many of the leaves are off, and until it looses all that delicious odor and sweetness so very acceptable to stock of all sorts. In good weather six hours' sun on it will cure it sufficient to go into the barn or stack. If water cannot be twisted out of the stems of clover, it will keep, and then the leaves and other nutritious qualities will be preserved. A peck of salt to each tun of hay would be an additional preservation, and the best way salt could be given to cattle. To save clover seed, mow the second crop as much above ground as will just cut all the clover heads, leaving as long a stubble as can be, to protect the root from injurious effects of the heaving spring frosts, which are apt to throw the clover roots out, if left too bare by mowing or pasturing. After the seed is mowed, leave it in swarth until wet with one or two rains, to rot the hull or chaff that contains the seed, otherwise it is very hard to thrash out. In many places they have clover seed mills to take out the seed, but persons having a good thrashing machine can get it out quite expeditiously; and it is a profitable crop at $5 per bushel. It is estimated one year with another that land that will produce 15 to 20 bushels of wheat will as certainly produce 4 to 5 bushels of clover seed per acre, quite as valuable, with much less labor than the wheat crop.

Timothy grass, called Herds-grass, in New England.—This is a valuable grass for hay, is very productive on clay loam, rather moist than dry. In newly cleared land, if well grubbed and all the leaves carefully raked and burnt, it will be best not to plough the ground, which would bury the mellow fertile surface soil, and bring up the stiff unproductive clay, but instead thereof scarify the surface well both ways, sow and harrow in the seed, then roll it well to make the surface compact; as there are often some remains of old rotted leaves which would be too porous without rolling for the young plants to live in. The land is much quicker got in order this way, on rooty new land, than by ploughing, and is much better for the above fibrous rooted crop, which requires fertility, but not deep tillage. The seed is best sown from the middle of August to the first of October, but about the middle of September is the best time. And in February and March, 6 quarts of seed carefully and evenly sowed will do. Orchard grass, white clover or green grass may be profitably mixed with timothy, especially if it is intended for pasture.

Orchard grass.—This grass is very productive of hay and pasture, it grows very quick, fit to mow when the clover is, and may very profitably be sown with it. It may be sown in the fall, with winter grain, or by itself; or in the spring with oats or barley. If sown in the spring on wheat it does well, but must be harrowed, as the seed is light and long, and would not get covered otherwise. When sowed alone it will require 1½ bushel of seed to the acre. ROBERT SINCLAIR.

Clairmount Nursery, near Baltimore.

PROCEEDINGS OF THE SOUTH-CAROLINA AGRICULTURAL SOCIETY.

From the Southern Agriculturist.

At a meeting of the South-Carolina Agricultural Society, held in Charleston, on the 22d July, 1842, the annexed preamble and resolutions were read by R. W. Roper, esq., vice-president of the society. After a mature consideration as to the prospective benefit to the state—the aid and utility to individual agriculturists, and the practicability of legislative aid, the following resolution was adopted:

Resolved, That the preamble, setting forth in

detail the merits of the question of an *Agricultural Survey of the State*, and the consequent resolutions, be addressed to the different agricultural societies of the state, requesting their opinion, and if consonant with their views relative to the same important object, their co-operation. The plan devised as the best, is for the various societies to petition the legislature at the ensuing session, or to submit the same to the General State Society who hold their meetings at Columbia, and request them to present the said petitions, and to lend their aid in conducting the same to a successful result. FRANCIS D. QUASH,

Corr. Secretary of So. Ca. Agr. Society.

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Mr. President:—I am desirous of enlisting the action of this society, in a measure of much importance to the prosperity of our state, in promoting the cause of agriculture. My design is, through its medium, to invite the attention of various agricultural societies throughout the state to the importance of effecting an agricultural survey of the parishes and districts of South-Carolina, and, by simultaneous petition to the Legislature, impart a probability of success. This subject was agitated in the legislature during the last session, introduced to their consideration by the recommendation of the governor, and, after very general discussion, the following resolutions, submitted by the committee on agriculture, were adopted:

Resolved, That an agricultural survey of the state of South-Carolina is highly expedient and necessary. That it will prove a means of developing and improving her resources—retaining at home her citizens and slave labor, and counteracting, in some measure, the effects of competition, in her great staple, from the fertility of new lands in other states.

2. *Resolved*, That the result of each year's survey be annually reported to this house, and copies distributed to every agricultural society throughout the state.

The following and last resolution, intended to give effect to the two preceding, was lost, viz.

Resolved, That the sum of $3,000 be appropriated for the ensuing year to said survey, and that the governor be specially charged with the selection of a capable person to execute the same.

A larger vote was taken in the house of representatives, in favor of these resolutions, than had ever before been known. It was asserted in the course of argument, that if a survey was desirable, it ought to be so intimated by some of the agricultural societies of the state, whereas no petition to that effect had emanated from any of them. This objection I propose to obviate, and show, that the agricultural community are fully awake to the important results that must spring from attention to this subject.

Some discrepancy of sentiments prevails among the advocates of survey, whether its character ought to be geological or agricultural. Both branches bear an analogy to each other. In effecting the accomplishment of the one, some light must be thrown upon the other; but to produce practical available results, they must be pursued separately and distinctly.

A geological survey is confined to minerals, metals, rocks and earths, and by collateral association, sometimes may bear on agriculture. The geologist digs into the bowels of the earth for scientific investigation or hidden treasure; the first involving antiquarian research—the last appertaining to commercial speculation, and requiring large capital.

The agricultural surveyor, in his investigation, seldom penetrates far below the surface of the soil, as his purpose is to examine its fructifying properties, which relate only so far to geology as the growth of a soil indicates its base and constituents. —Here the line of demarkation at once diverges, and the agricultural surveyor turns his attention to practical researches, in which he associates himself with the humblest tiller of the soil to aid with the light of science. Nature, in beneficence, has decreed that the earth shall put forth spontaneous productions for the welfare and food of man, but not to such extent as to impair the divine law, that from the sweat of his brow man shall eat his bread. He receives the productions of the soil, only as the germ of what he is to improve, and by care and observation perfects its character and usefulness. The mass of mankind pursue their objects with as little labor as possible, and are content to travel in the beaten track marked out for them. Some independent spirits, gifted with investigating minds, escape this servile habit, and indulge their particular notions by experiments of their own; but such laudable efforts are often doomed to disappointment, when, if aided by science, perfect light would be thrown on the investigation.

This fact may be illustrated by stating the utility of a system of rotation in crops. The exuvie of one set of roots is often pernicious to a plant of the same species, and stimulating to those of a different species. A soil is frequently said to be sour, which implies the existence of vegetable acids, operating on a plant in a manner which only science can account for. I once planted a field in cotton, which gave flattering promise till the bowls of the plant began to form, when they dropped in such abundance as materially to impair the produce. A field on a contiguous plantation was abandoned from a similar cause, the cotton being said to take the rust. A friend of mine, of high intelligence and enterprise, planted in rice, for ten years, a piece of swamp on Cooper river, (low down the river,) where the plant in its early stage was vigorous and promising, but about the period of jointing and the ear to swell, the stalk became attenuated, assumed a russet hue, and the crop always proved unproductive. This land is now abandoned, and the fine banks and ditches in destruction. How much time, expense and profit may have been made available, in these instances, by a judicious agricultural surveyor, who would have pointed out the peculiar diseases of the land and corrected the gradual decrease of always scanty crops? In Massachusetts, H. S. Colman has doubled the value of some of the townships, by imparting to owners a knowledge of the properties of the soil they cultivated. In England and Scotland the agricultural chemist is applied to for that purpose, and he designates the manures and products most congenial to the soil, which saves expense and crude experiments. Recent discoveries have established the fact, that all soils contain an acid not hitherto suspected, called humic acid, from the Latin word *humus*, (earth,) and humin appears to

constitute a leading principle in all soils and manures; it is formed of carbon and hydrogen, and the humic acid of humin and oxygen. It combines with lime, potass and ammonia, in the form of humates, and the smallest portion of these will render it soluble in water, and fit to be taken up by the spongelets of the root fibres. Ignorance of the important action of this acid in dissolving earthy matters, puzzled old writers to discover how lime and potass got into plants. For these hints I am indebted to Edmund Ruffin, the highly talented surveyor of Virginia.*

A whole section of country may contain manures which science alone can render available, and the farmer go abroad for a supply of marl and lime, which scientific research would discover at home. Beds of limestone often lie with a horizontal inclination, and in a line of a few miles present to a farmer at one extremity of the line a quantity of limestone on the surface of the soil, which a farmer at another extremity of the line might suppose he did not possess, but which the agricultural surveyor would put him in possession of by instructing where to dig. But, in some instances, even the application of marl may be deleterious to soil, as where no putrescent or vegetable matter existed. This fact suggests the propriety of forming a knowledge of soils, and there does not yet exist in the science of agriculture a correct nomenclature of soils.

Many important duties appertain to an agricultural surveyor. The Massachusetts resolve, by which a surveyor was appointed, reads:—"To collect accurate information of the state and condition of the agriculture of the commonwealth, and every subject connected with it—point out the means of improvement, and make a detailed report thereof, with as much exactness as circumstances will admit."

The agricultural surveyor, therefore, visits every town in the state—every principal farm or plantation, the management of which promises to afford useful information, and corresponds and co-operates with practical men.

An agricultural survey relates to the nature of the soil, particularly in reference to the nature of the crops cultivated; to the climate, with reference to the growth of crops, number of acres cultivated, in what cultivated, the modes adopted, and the proceeds; to manures, to live stock of all kinds, as animals for pleasure, labor, food, for the dairy; to dairy produce—to poultry—diseases of domestic animals—bees—orchards—gardens—farm buildings—farming implements—and many miscellaneous subjects.

A letter from Henry Colman to Whitemarsh B. Seabrook, esq., dated 13th October, 1841, says, the agricultural survey of Massachusetts "has so far accomplished all that could have been reasonably expected from it. One of the most intelligent farmers of the state says, that it has already been worth three-hundred thousand dollars to the commonwealth. It has awakened a strong interest in the subject of agricultural improvement of the state. It has developed the agricultural resources of the state—has induced many farmers to keep an exact account of their husbandry, its expenses and returns, of which, before, they never had any estimate. It has led to many important experiments in agriculture. It has extended the knowledge of improvements made in any and every part of the state throughout the whole state. It has contributed, essentially, to elevate and better the condition of the laboring classes, and to render the agricultural profession respectable. It has sown seeds which must continue to be more and more productive for ages to come."

A letter from the same source, to the same gentleman, says, "An agricultural survey of South-Carolina would be of greater advantage than, perhaps, of any state in the union at this time, if so directed as to bring into proper notice the calcareous manures now almost entirely neglected, and induce your planters to use them. Such a result would be worth to South-Carolina more than the doubling the present productions and pecuniary value of the land of all that great region."

The statistical information of the agricultural surveyor disseminates a knowledge of each district, of the sums expended for supplies of whatever description, which at once leads to wholesome reflection and salutary change in a defective or losing policy. If, for instance, it can be shown, according to the recent letter of Mr. W. B. Seabrook to the members of the legislature, that if an increase of a quarter of a bushel to the acre in corn, to the whole amount of land cultivated, were grown, the necessity of a foreign supply would be prevented, the saving to the state, at an interest of $1\frac{1}{4}$ per cent. on the amount expended on this single article, equal to $250,000, would abundantly compensate an annual cost of survey till the whole state was surveyed; and when we add the cost of horses, mules, cattle, hogs, beef, pork, butter, lard, onions, potatoes, tubs, baskets, oats, peas, hay, and numerous other articles for which we are tributaries, and which we can produce at home, an annual saving to the state ought to be effected, to the cost of $3,000,000. Do we not see lime and hay forwarded by rail-road and the rivers to Columbia, Camden, and intermediate parts of the state?—the sight ought to suffuse the cheek, of every patriotic Carolinian, with the blush of shame. The time was, when our Congaree boats, loaded with corn, lay at our wharves, when we exported corn, and now the reverse is the case.

The depreciation of our staple produce cannot stand this outlay. The boundless fields and prairies of the west supply cotton from 2 to 4 cents cheaper in the lb. than we can, and Texas is now swelling the produce. We must, therefore, retrace our steps. The time has passed when it was more profitable to plant cotton than corn, and the superfluous wealth which enabled to buy what we ought now to produce, has gone to other lands. The Sea-islands, without competition in their staple, scarcely support themselves; and the production of rice is not 20,000 barrels greater now than were exported fifty years ago.

Wise laws may be passed, and political axioms

* Mr. Roper has given to us a title to which we have no legal right. It is true that we have both surveyed and reported very extensively, though but in part, on the agriculture of Virginia, but it has been done altogether without authority from the state, or remuneration from any source. We fear that it will be long before the legislature of Virginia will order an agricultural survey; though its whole expense would not equal one-fourth of the annual cost of legislating to sustain fraudulent banks.—Ed. F. R.

expressed; but it is attention to the soil which gives a population for the one to operate upon, or impart consequence to the other. The value of laws and political axioms may be called forth by particular objects spread over a waste of time, but the consequence of a successful culture of the earth incorporates itself with our daily necessities and transactions. In every stage of society, the most elevated or humble, it contributes to the food we eat, the raiment we put on, and the habitations in which we dwell. It contributes to individual consequence, and becomes the national prop. An agricultural survey will afford the best statistics of the country, not drawn from general, but individual observation—will bring congenial intellects into communion, or collision, and elucidate facts which must tend to individual happiness and general prosperity. Instead of ignorance and squalid want, you will enjoy education and comfort—instead of emigration, permanent residence—instead of deserted habitations and abandoned fields, where the owl hoots from the window, or the fox starts from the thicket, you will have fields smiling with verdure and crowned with golden harvests—"the desert will rejoice and blossom as the rose."

It behoves us, therefore, to be on the alert—to take time by the forelock, and see how we can retard our fall, or advance our prosperity. One of the means, I consider to be an agricultural survey of the state; I therefore invoke the aid of this society in effecting such a salutary purpose by originating a move on the subject—by transmitting circulars to the twenty-six agricultural societies of the state, requesting them to unite with this society in memorialising the legislature of our state to carry out this important aid to our advancement. In furtherance of the object, I offer the following resolutions:

1. *Resolved*, That an agricultural survey of the state of South-Carolina has become highly expedient, as tending to retain and advance the population and wealth of the state by promoting improvement in agricultural science—developing resources now hidden or neglected and requiring scientific aid to bring to light.

2. *Resolved*, That a petition be sent from this society to our next legislature, praying that measures be adopted for an agricultural survey of the state.

3. *Resolved*, That a circular be sent to every agricultural society in the state, proposing co-operation with the Agricultural Society of Charleston, in effecting this important purpose, by simultaneous petition to the legislature, praying them to take measures to effect so useful and desirable an object.

4. *Resolved*, That our corresponding secretary be charged with the carrying out the objects of the above resolve.

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